A Biological Sampler

By

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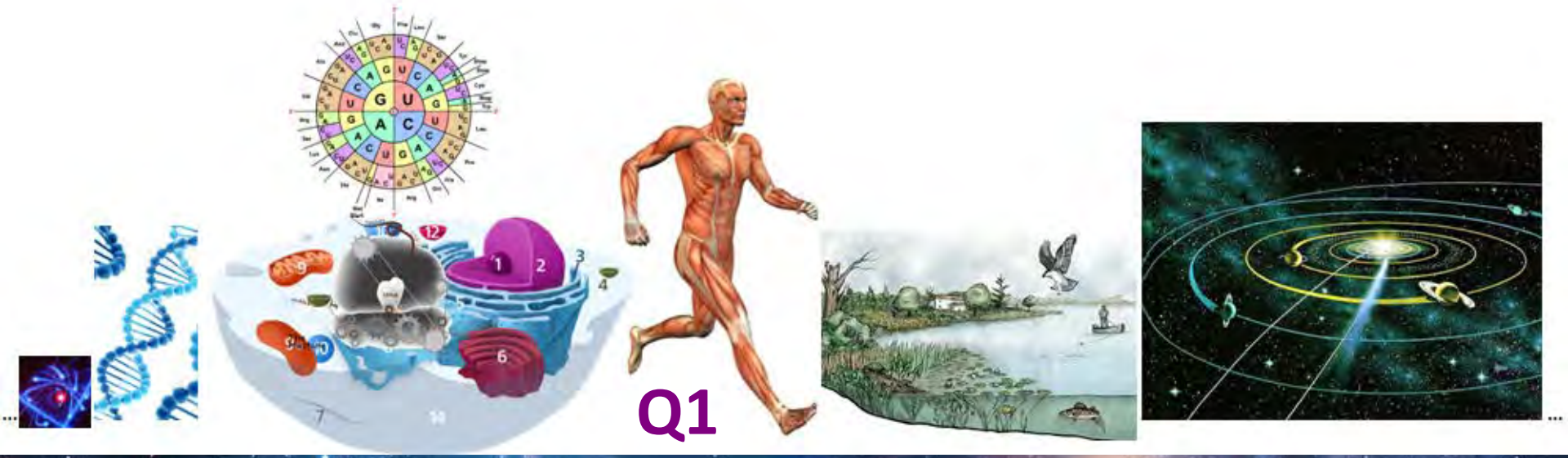
https://www.facebook.com/fernando.castrochavez.90

Yes Prep West

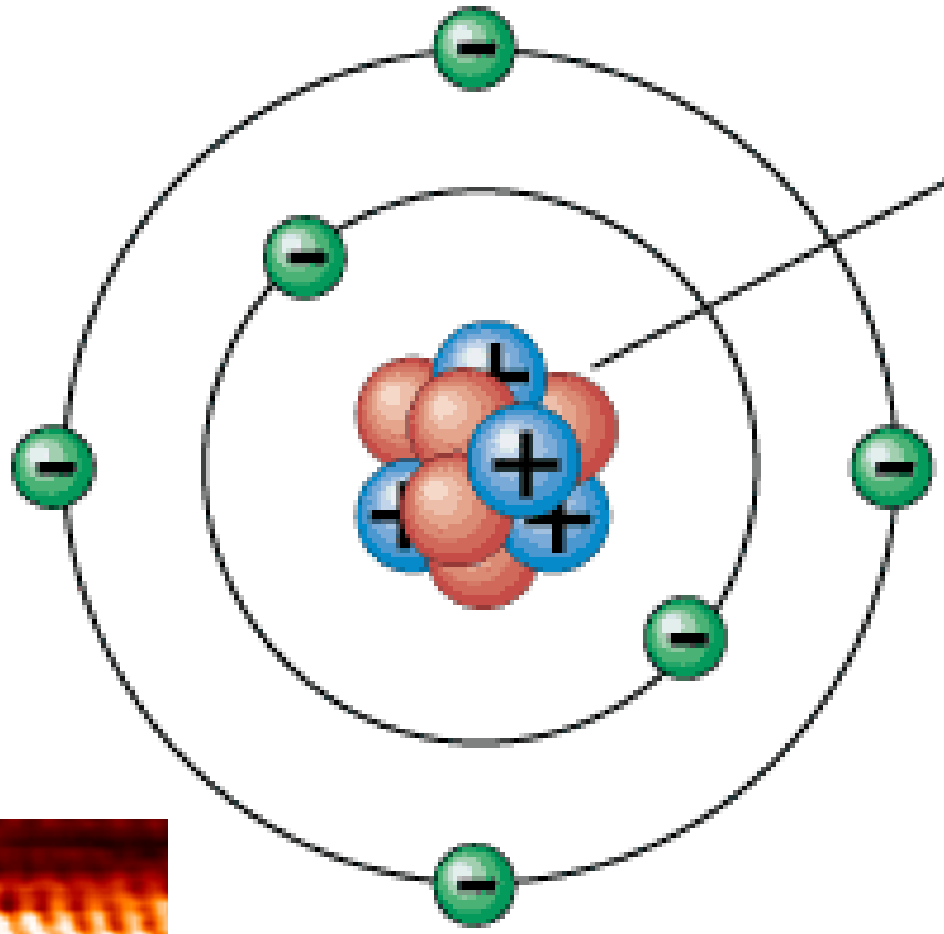
2013

Where are we in the Universe?

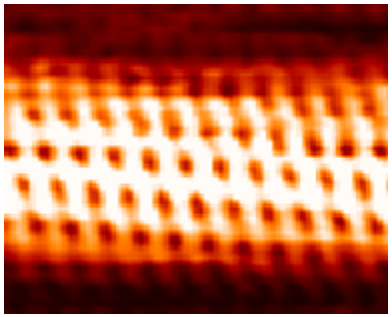


Are we located at the center of $(-\infty, +\infty)$?

The Atom

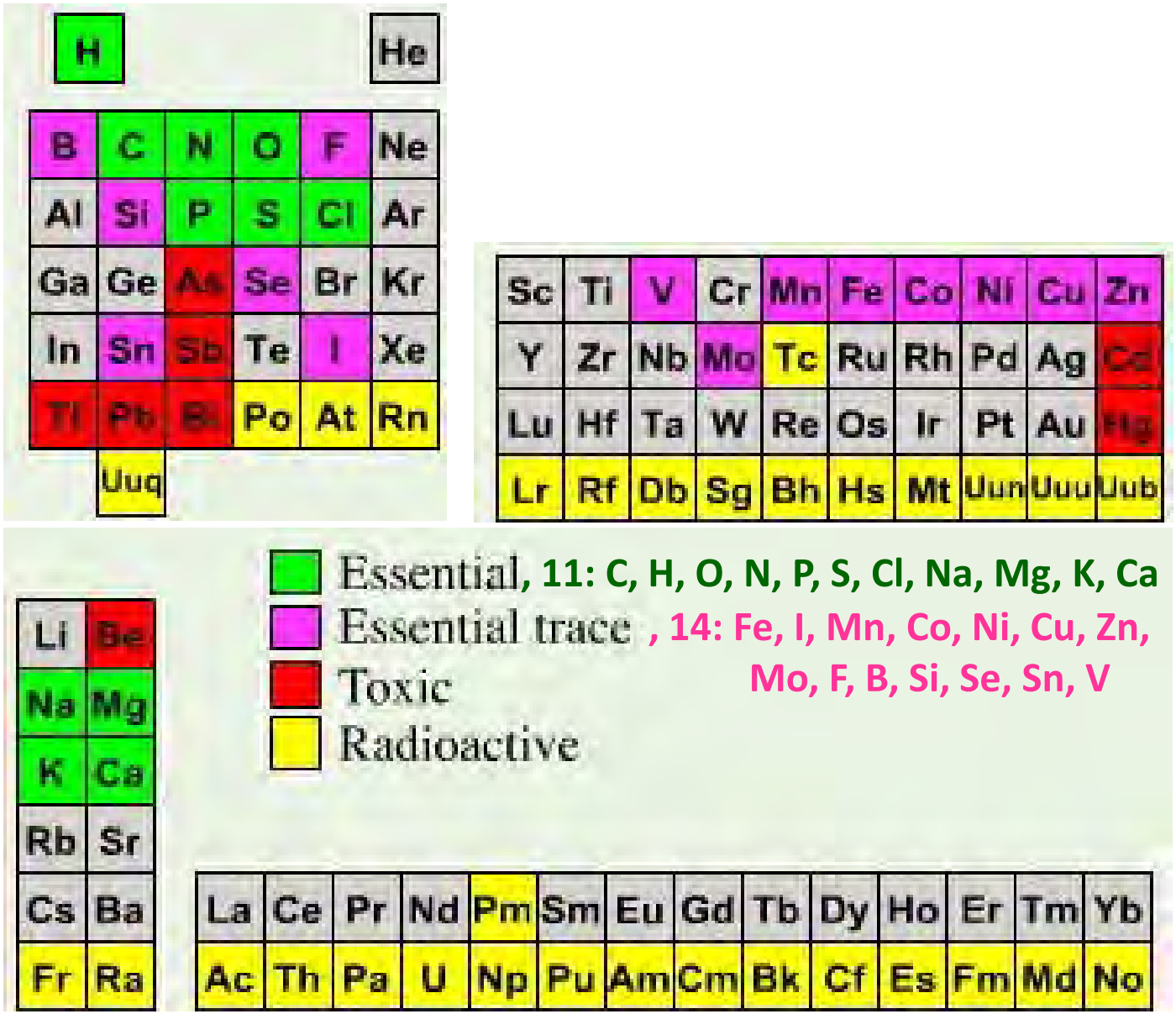


Carbon atom

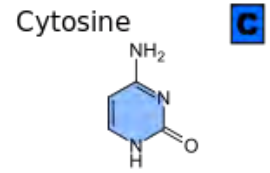


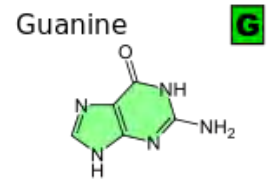
Q2

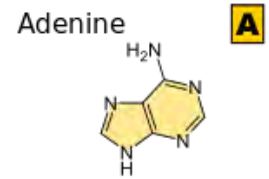
Essential (and Toxic) Elements for Life

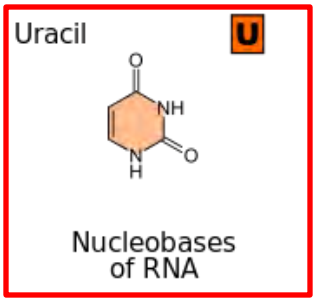


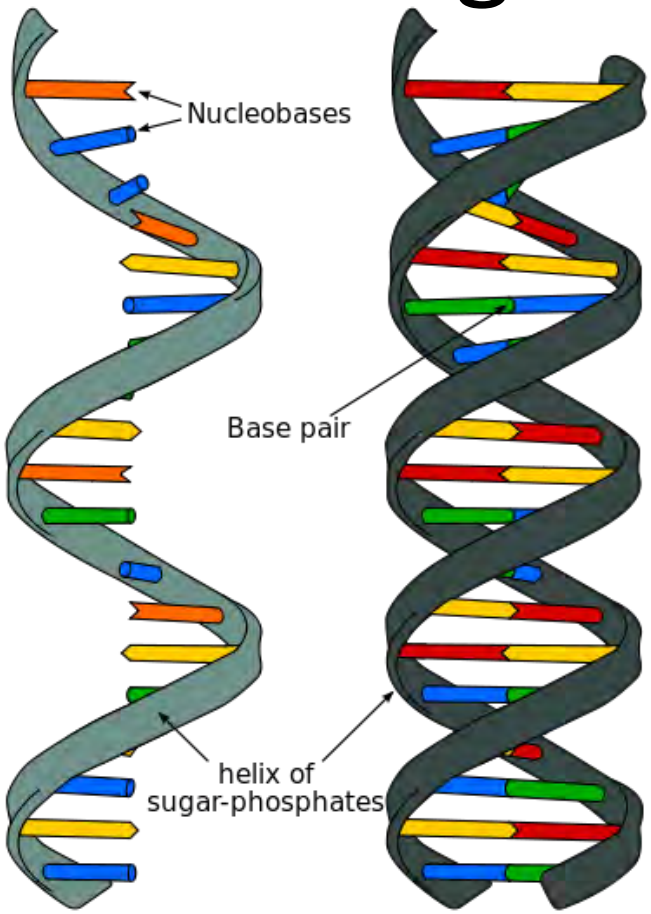
Some Organic Molecules

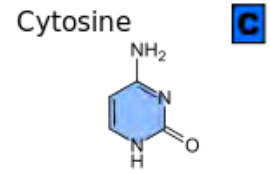


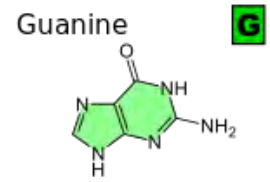


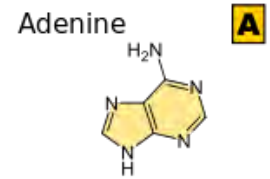


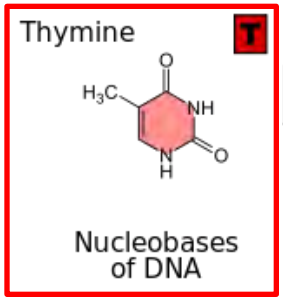


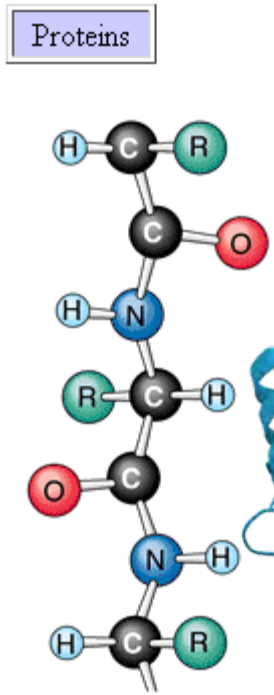


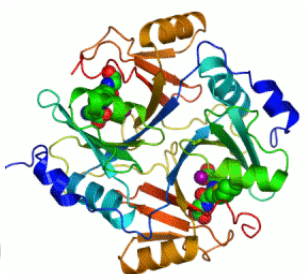


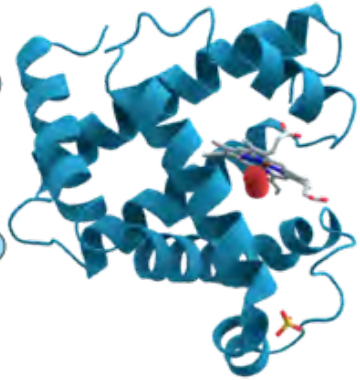


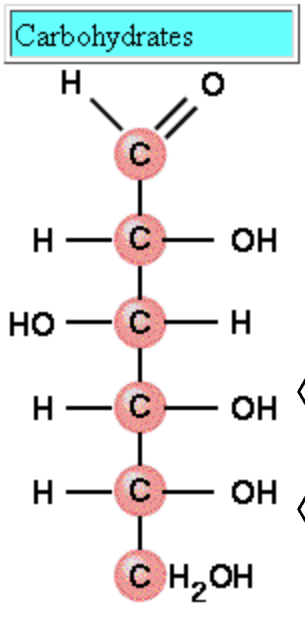


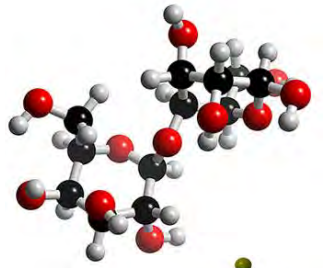


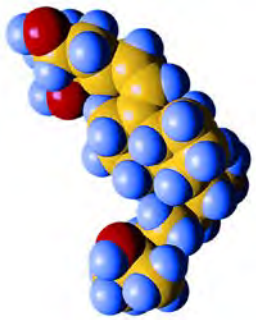


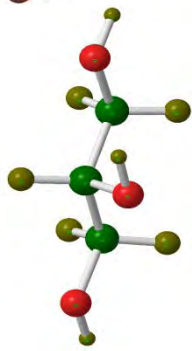


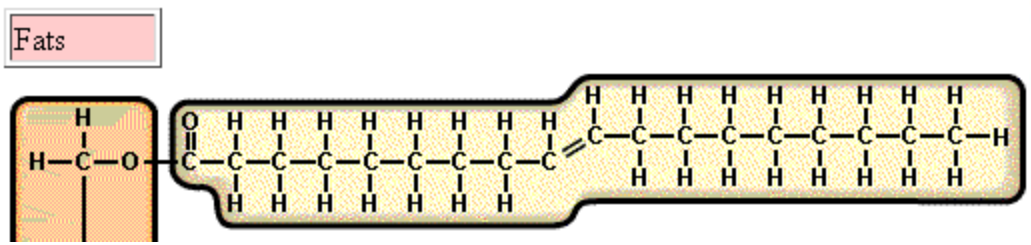






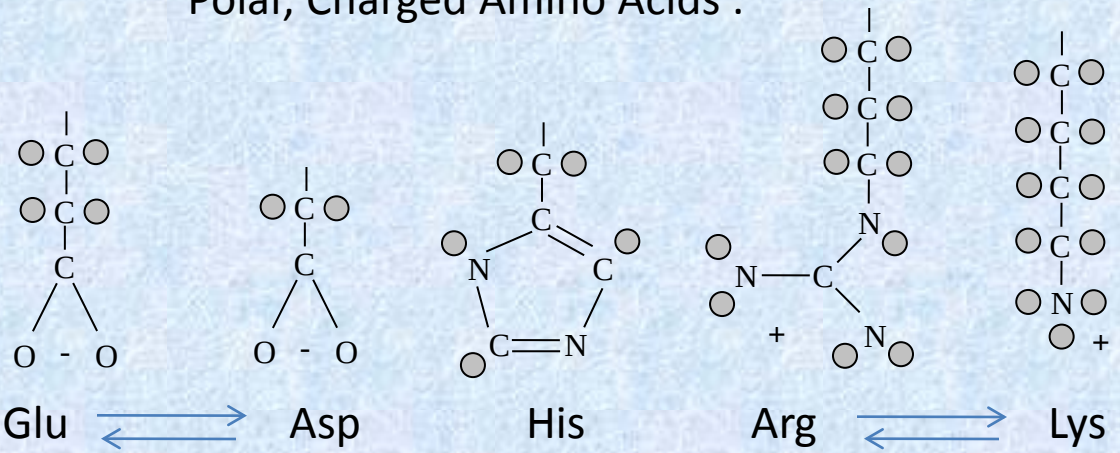






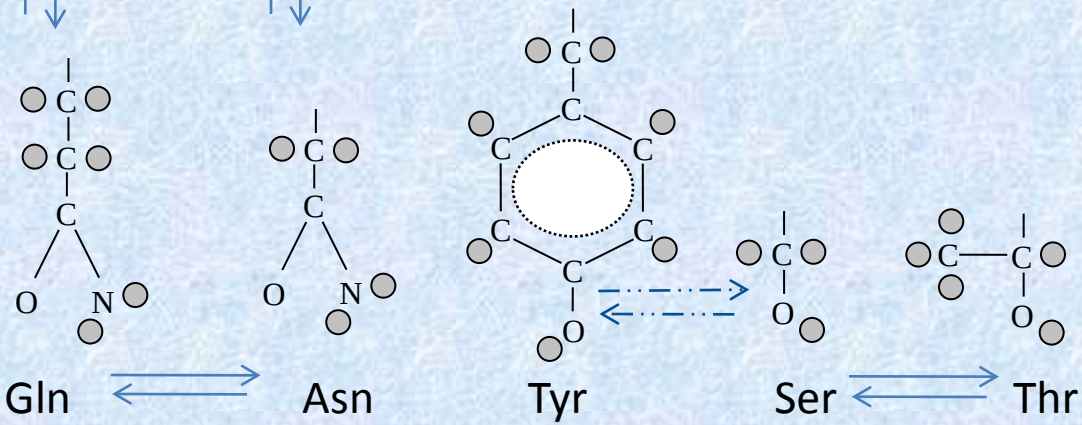
Variation

Polar, Charged Amino Acids :



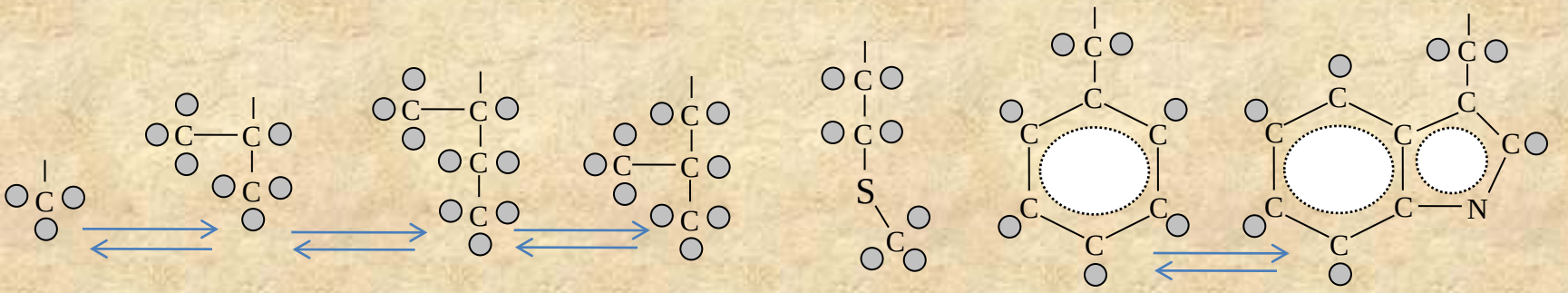
Blue Arrows: Changes that promote variation: Multiple functional proteins, similar but not identical

Polar, Partly Charged Amino Acids :



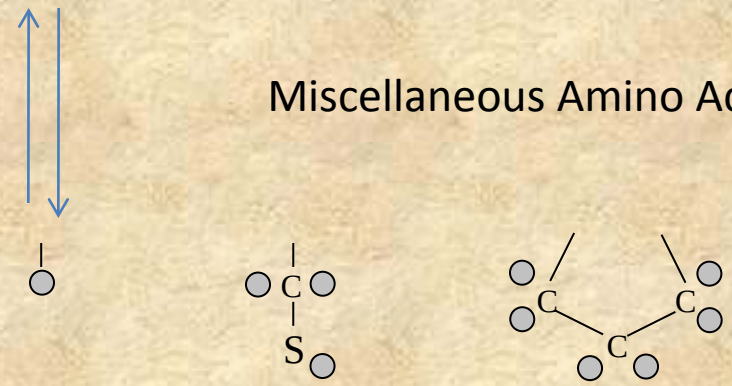
Variation

Hydrophobic Amino Acids :



Ala Val Ile Leu Met Phe Trp

Miscellaneous Amino Acids :

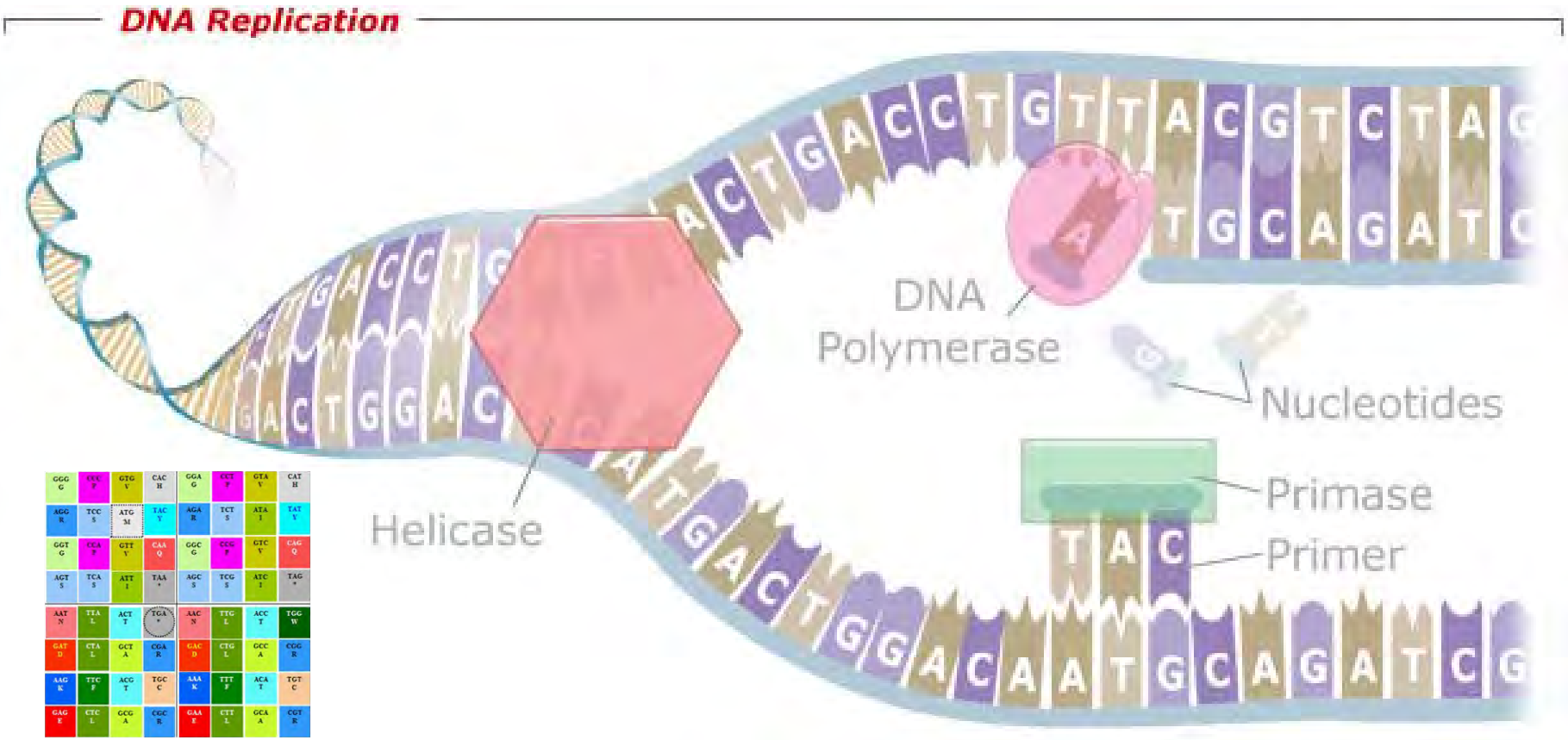


Gly Cys Pro

Blue Arrows:
Changes that promote variation: Multiple functional proteins, similar but not identical

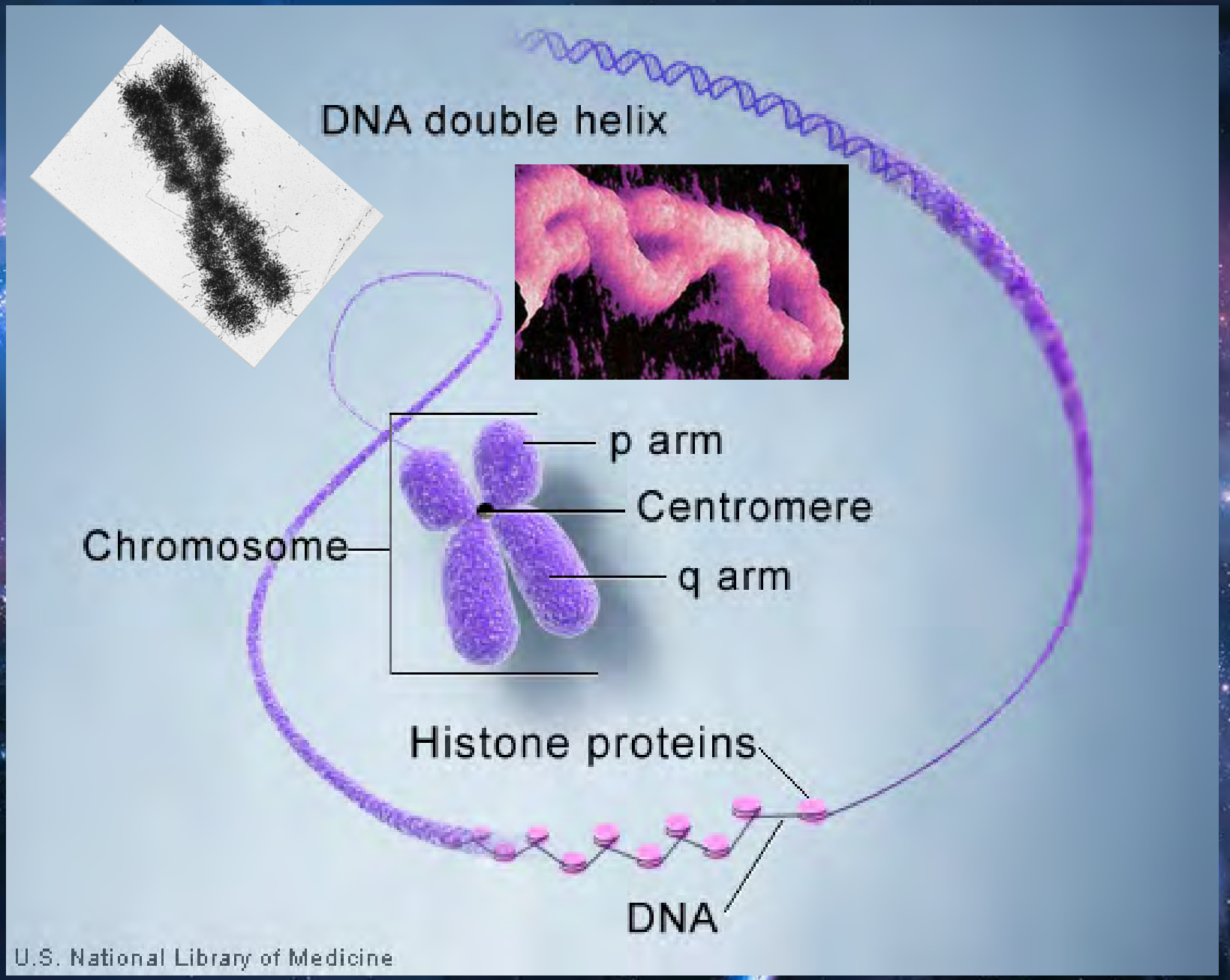
Replication of the DNA Double Helix

- During Interphase the cell's chromosomes duplicate.
- This is the phase that occurs BEFORE mitosis begins.
- It's a period of Growth and of DNA Replication.

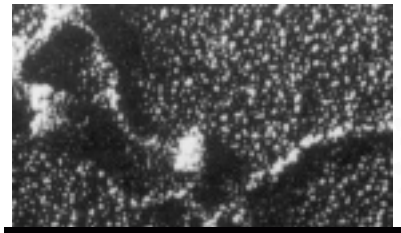


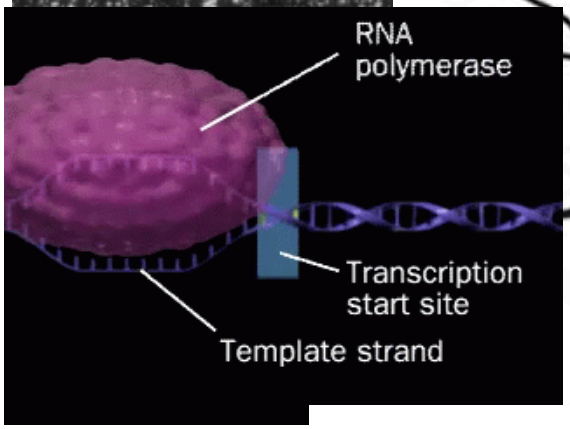
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3575644

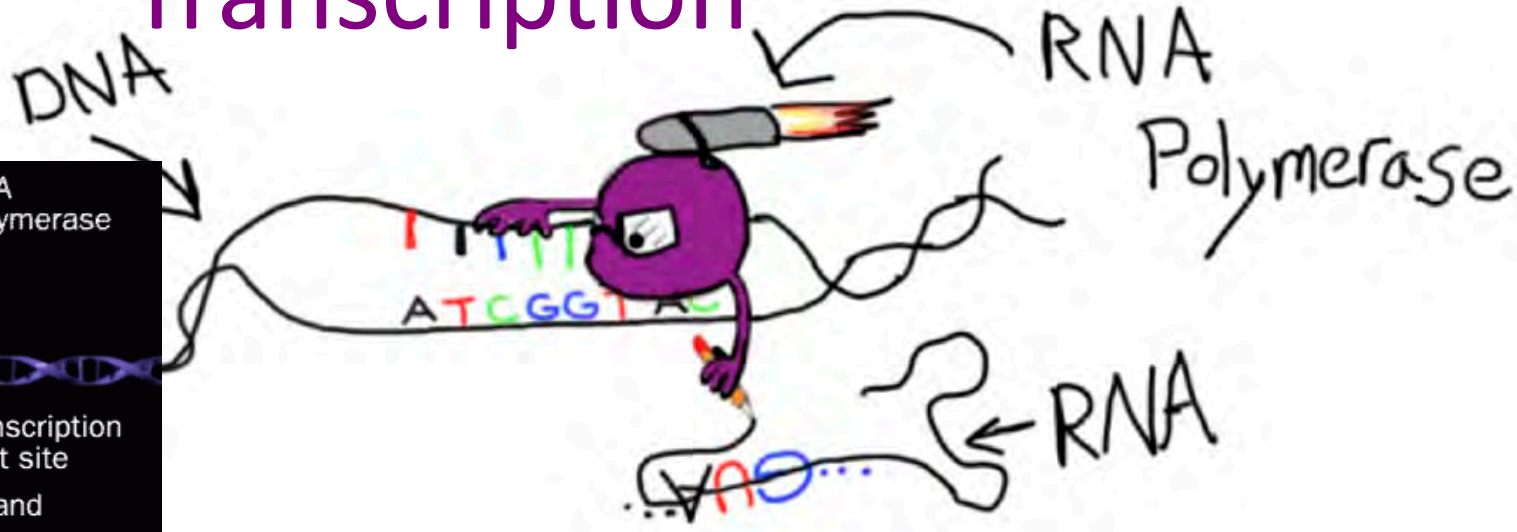
The Chromosome

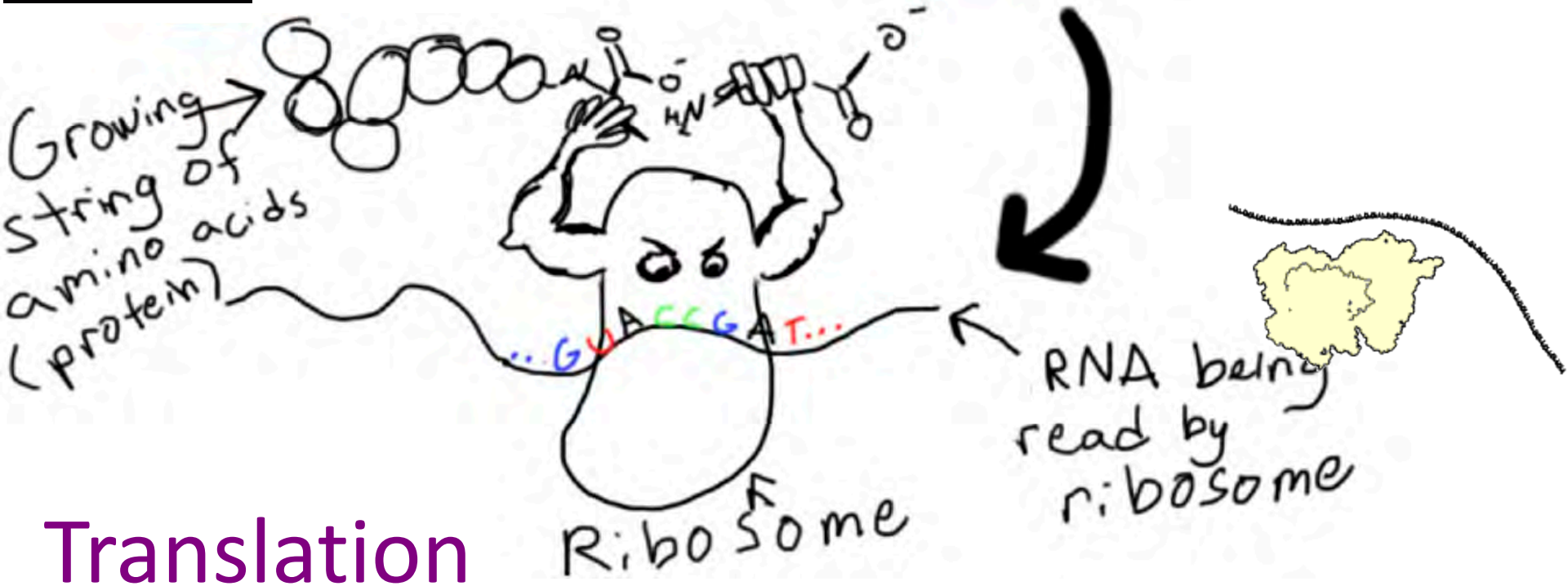


Transcription



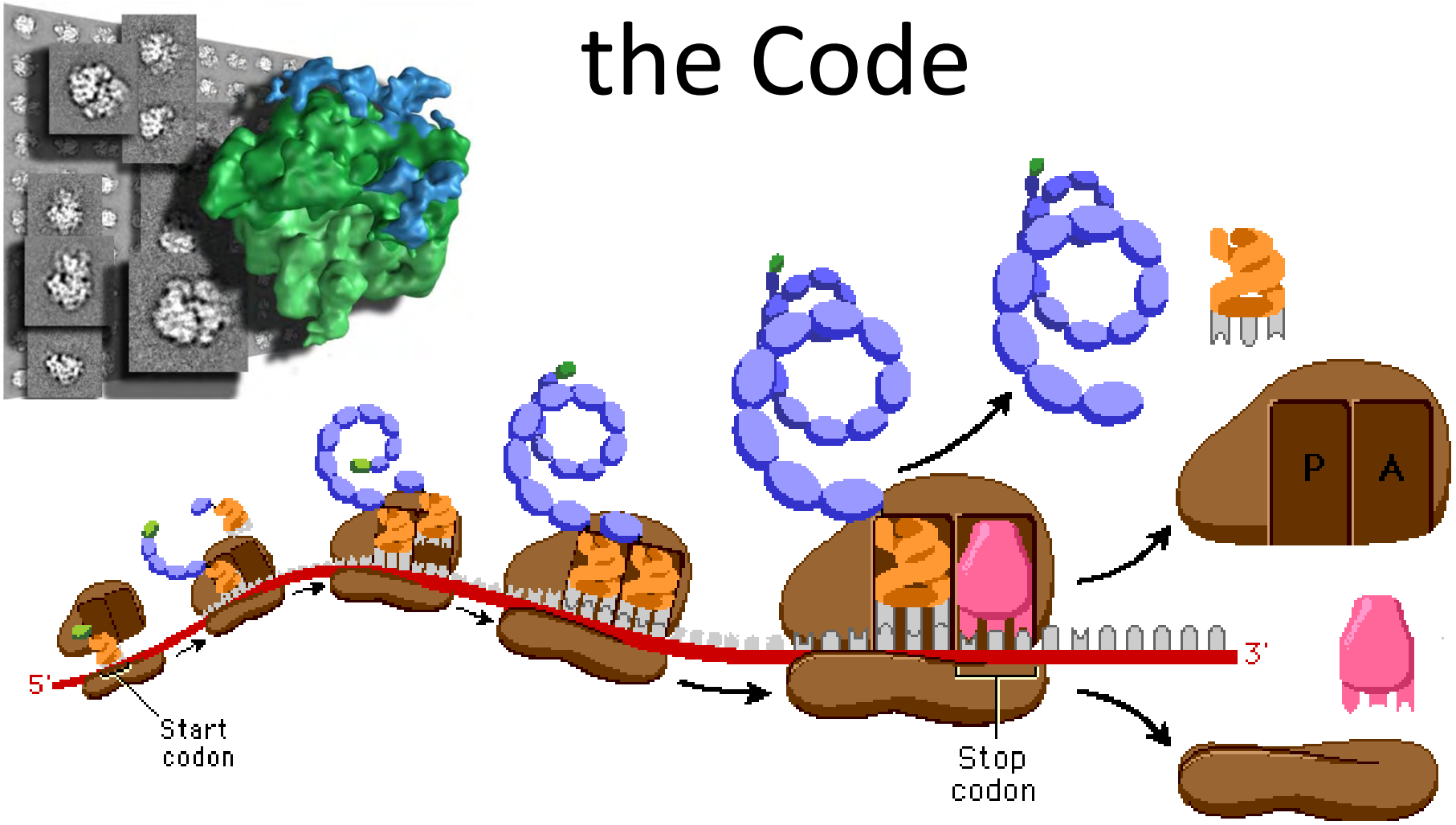




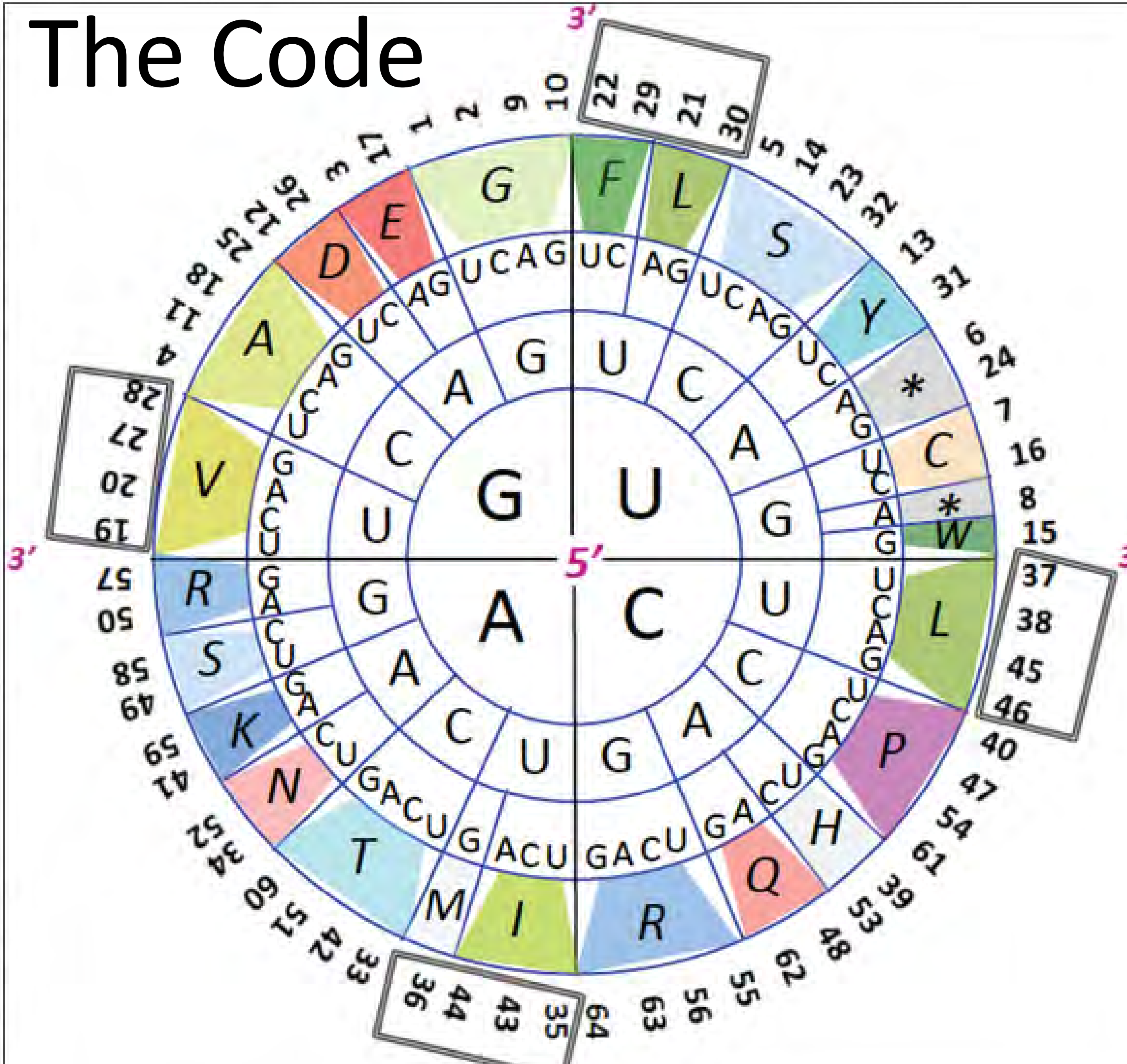


Translation

The Ribosome, the Translator of the Code

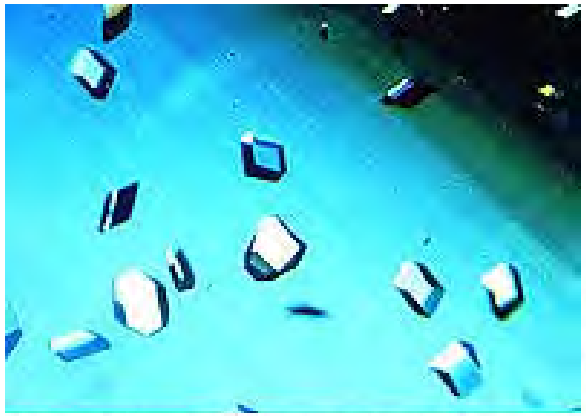


The Code



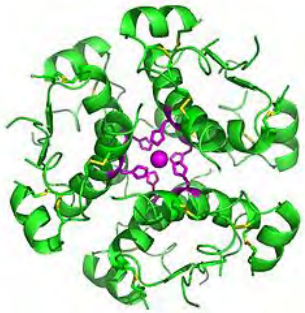
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3445437

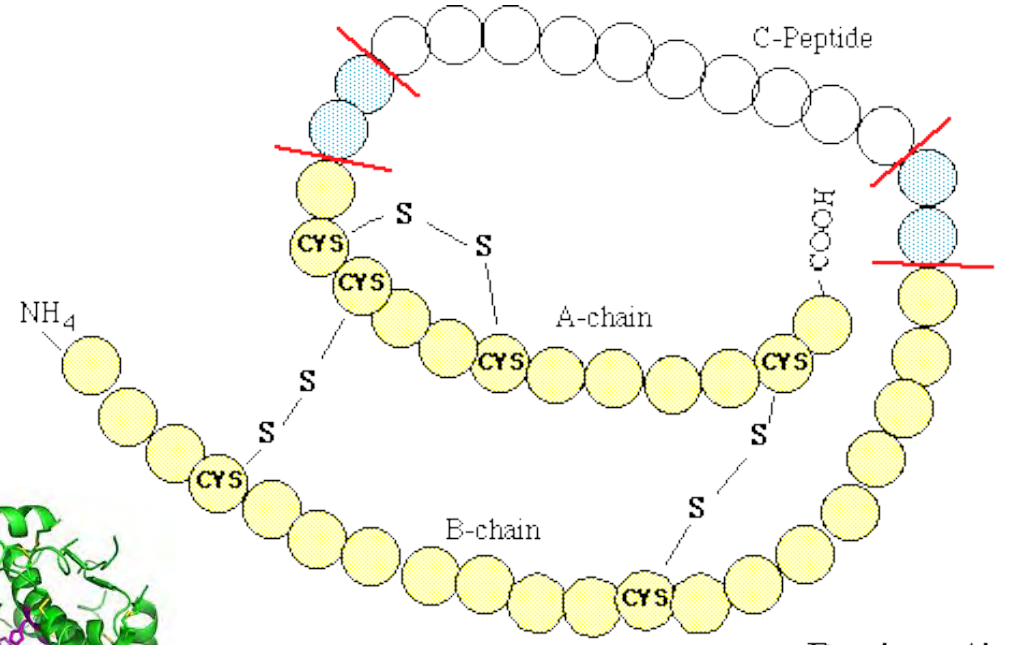
Peptides and Proteins



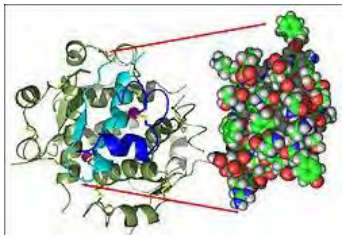
Earth-grown insulin

Space-grown insulin





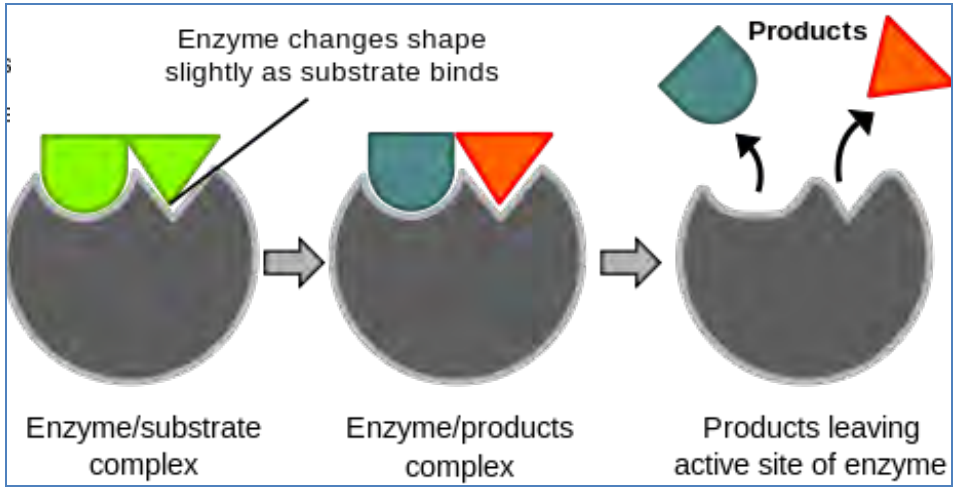
Proinsulin

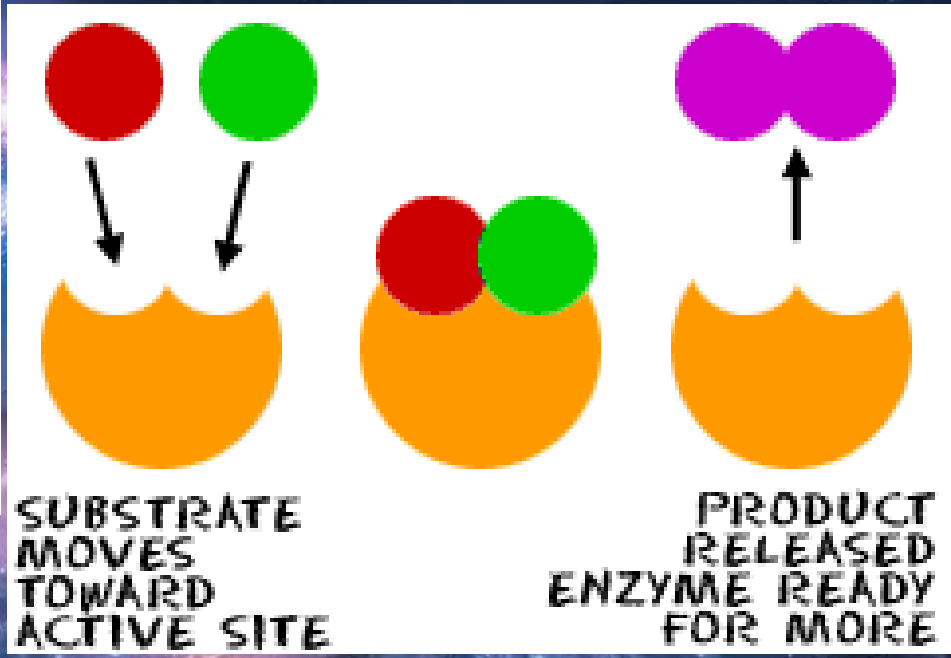


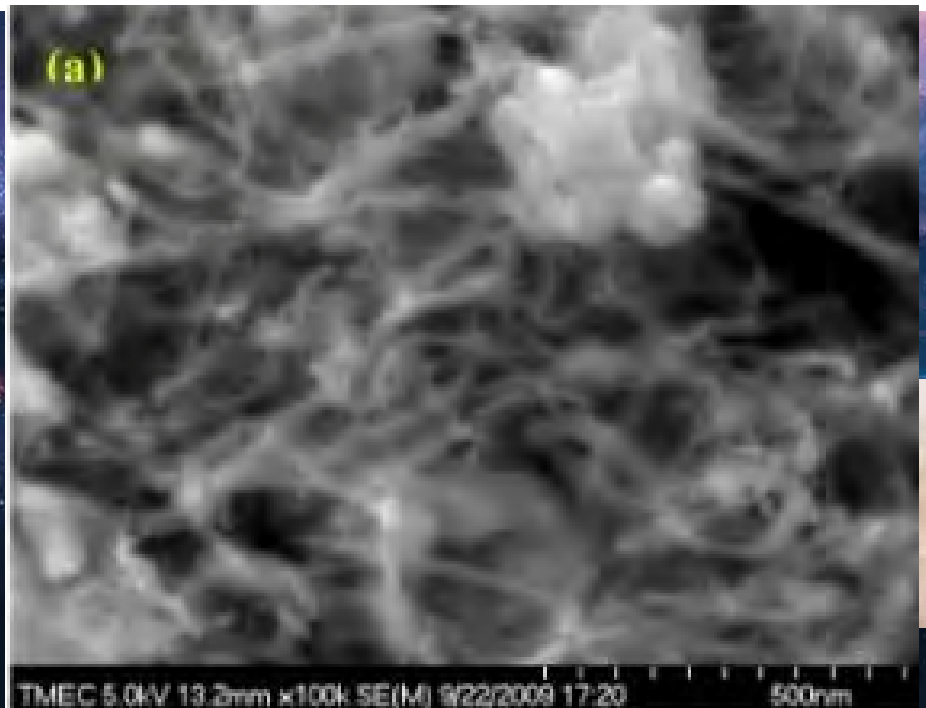
Insulin

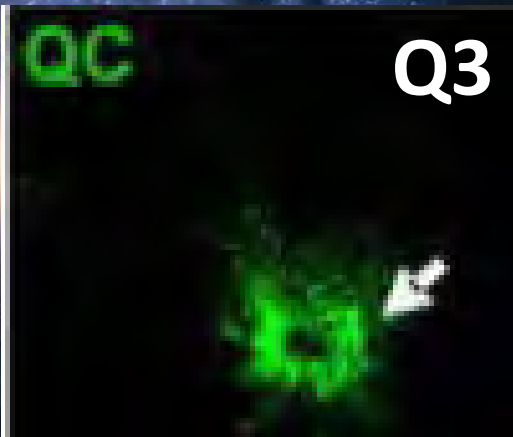
http://www.pharmacology2000.com/Diabetes/physio1.htm

Catabolic and Anabolic Enzymes

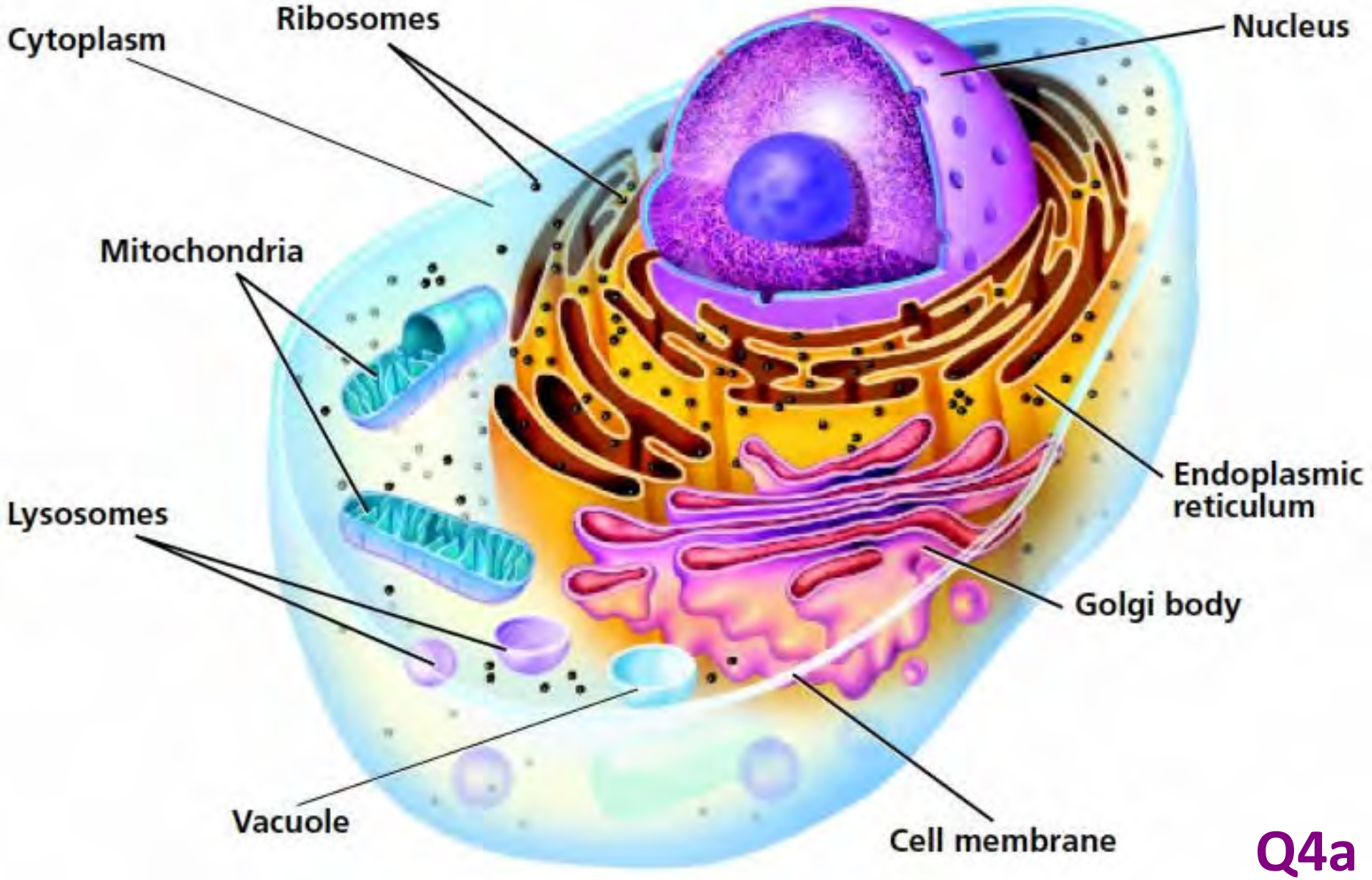








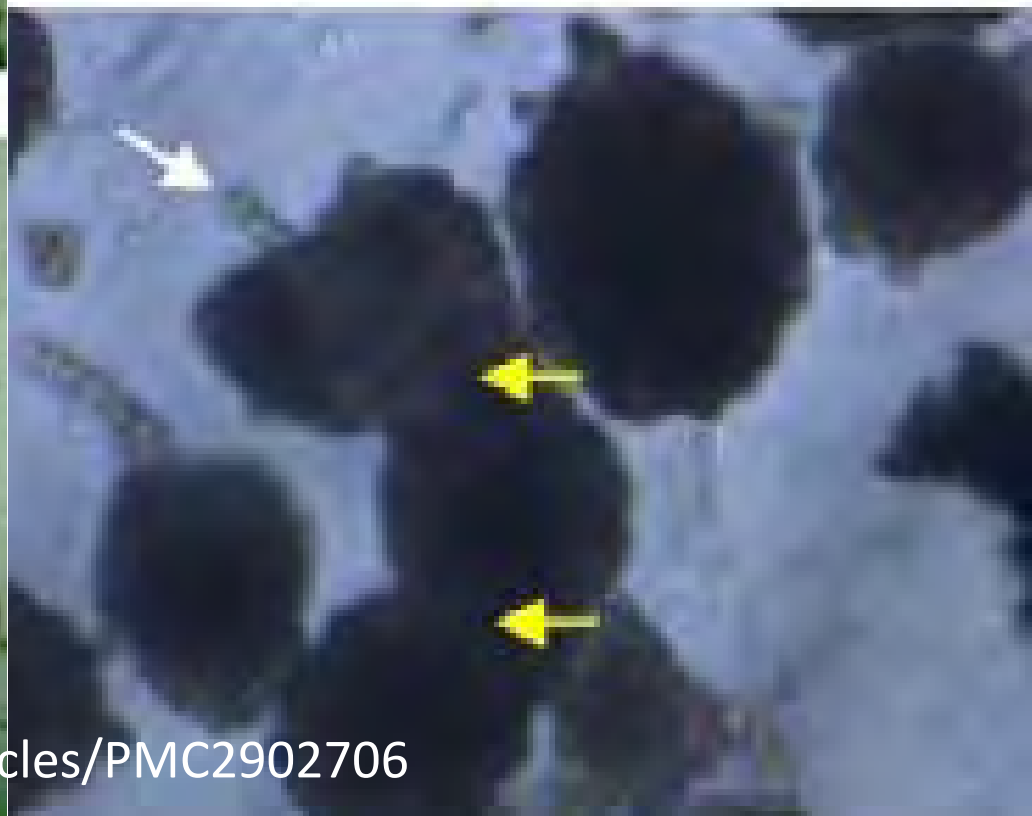
The Cell


Cytoplasm
Ribosomes
Nucleus
Mitochondria
Endoplasmic reticulum
Lysosomes
Golgi body
Vacuole
Cell membrane

Q4a

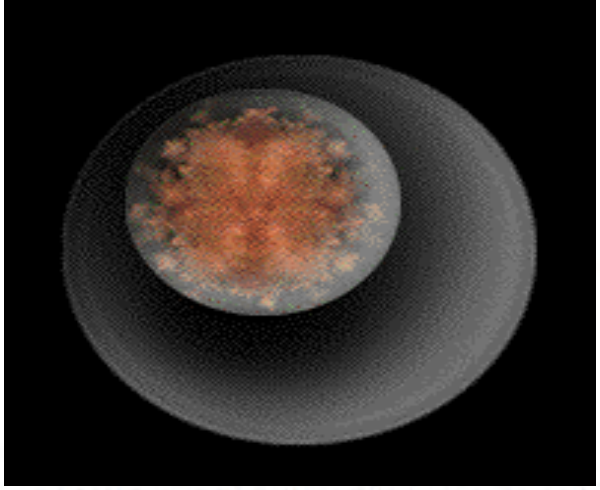
Cell Cultures in 2-D

Cell Cultures in 3-D

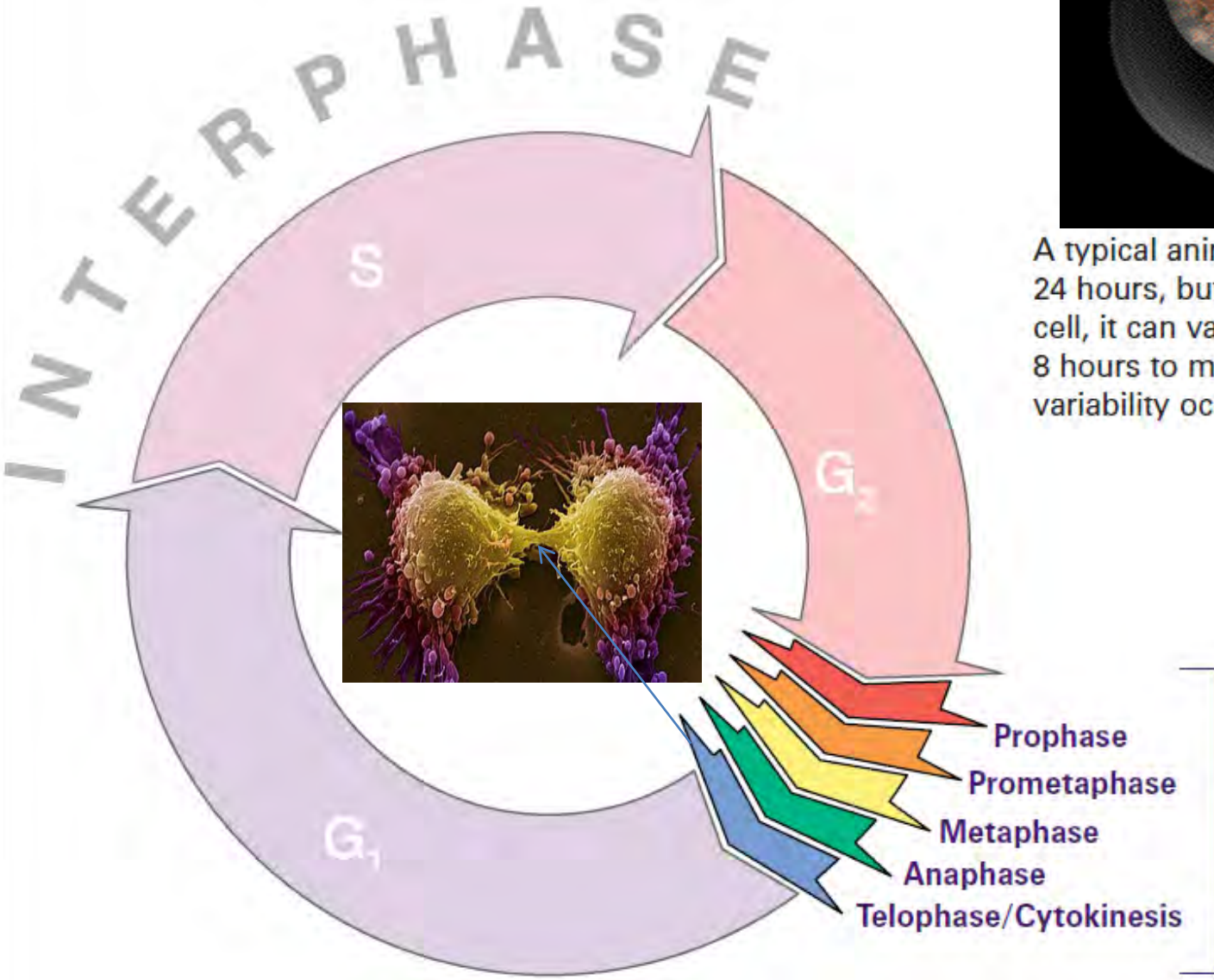


http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2902706

The Cell Cycle

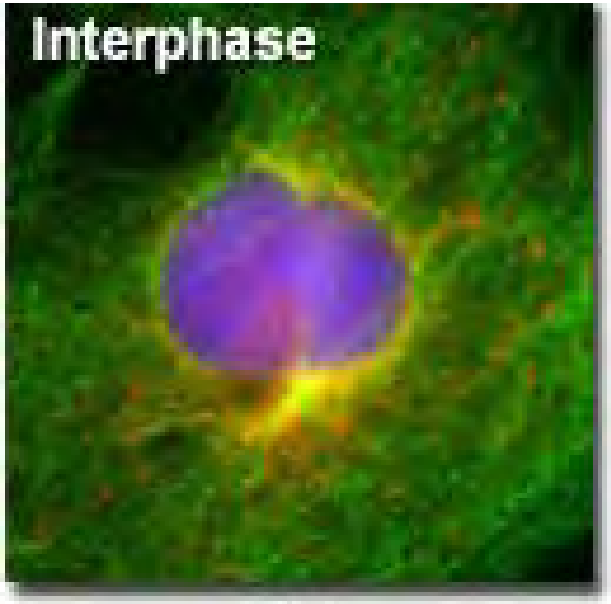


A typical animal cell cycle lasts roughly 24 hours, but depending on the type of cell, it can vary in length from less than 8 hours to more than a year. Most of the variability occurs in G_1.



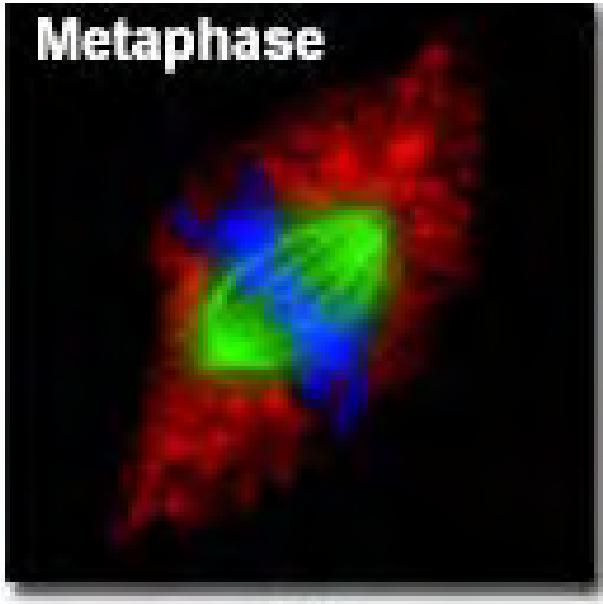
http://publications.nigms.nih.gov/insidethecell/pdf/inside_the_cell.pdf

Basic Steps of the Cell Cycle:

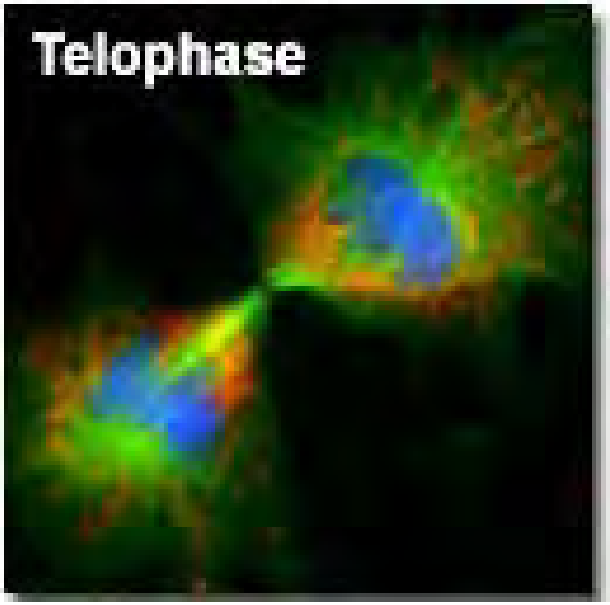


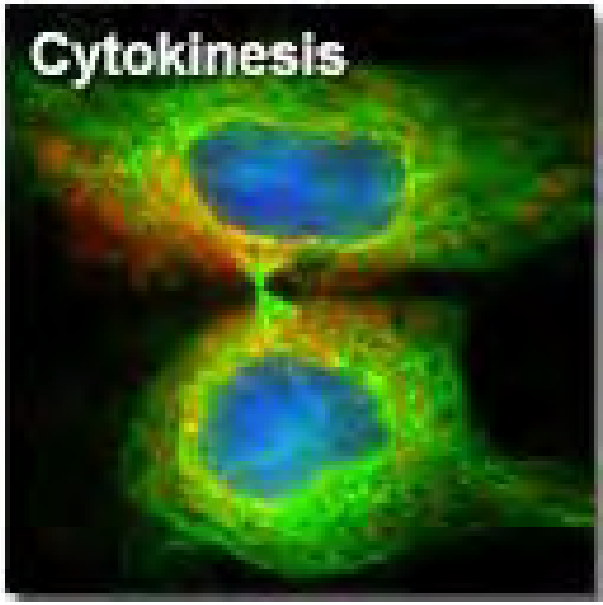
(a)

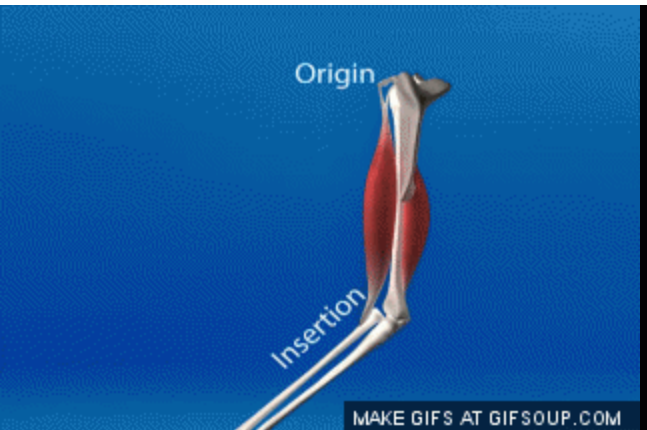
(b)



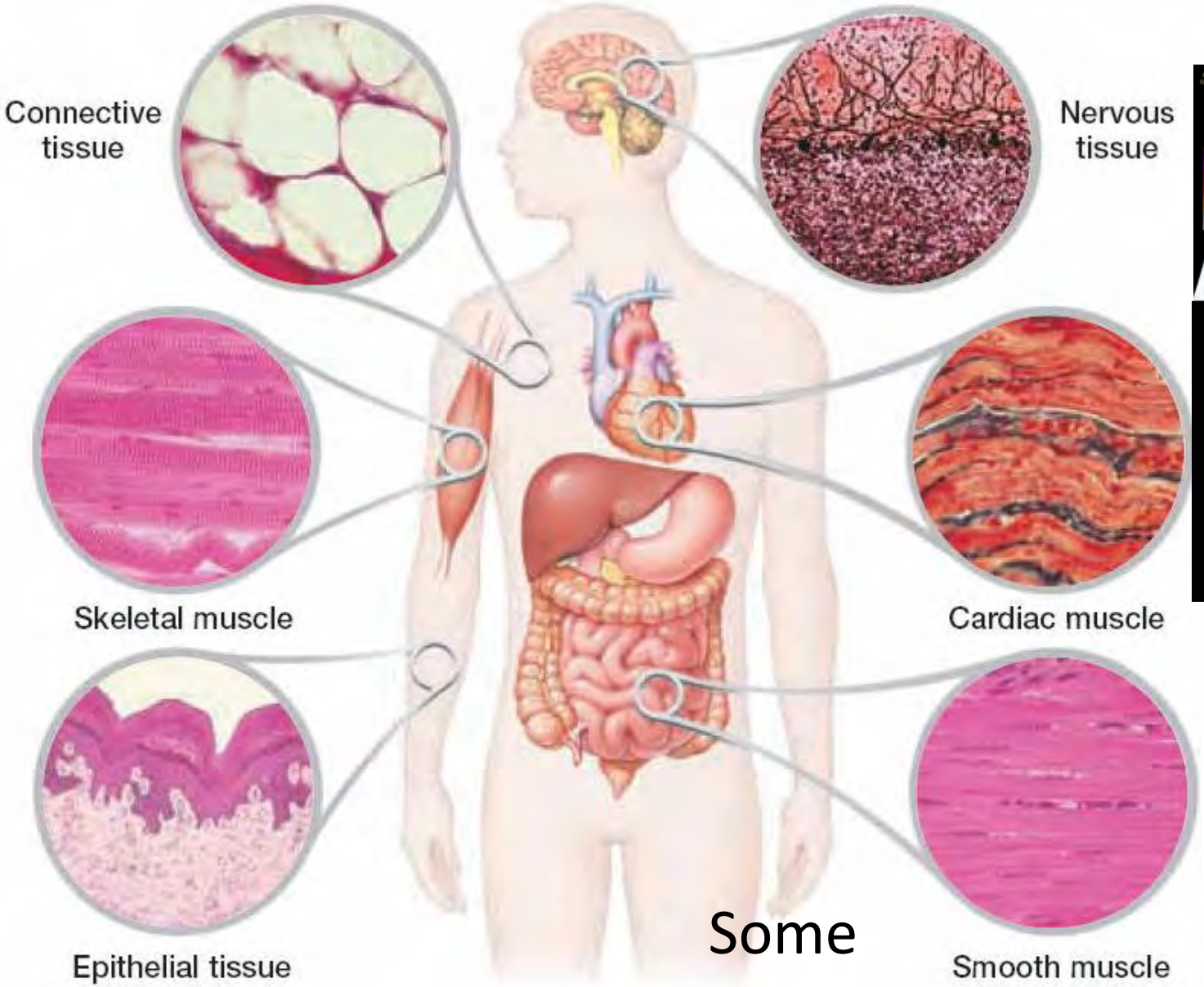
(c)

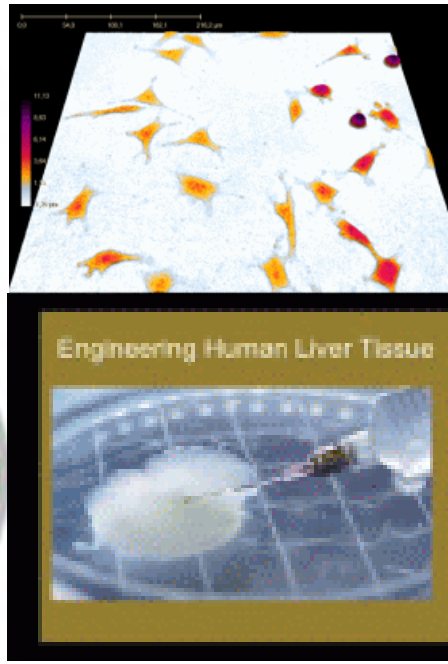






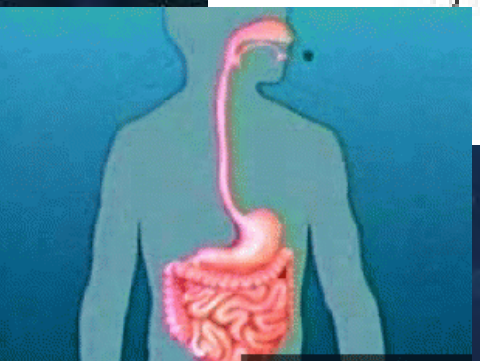
Human Organs





Some Human Tissues

Q4b



Human Anatomical Systems

Urinary system
Reproductive system
Integumentary system
Skeletal system
Respiratory system
Muscular system
Digestive system
Lymphatic system
Endocrine system
Circulatory system
Nervous system

Q5a

Ecosystems

example streams and rivers.

Wetlands Areas where the soil is saturated or inundated for at least part of the time.

containing **97%** of the **world's water**

Home to **41%** of all **marine species**

0.6% all land surface water like rivers, lakes and ponds

2.4% is frozen in glaciers and polar ice caps

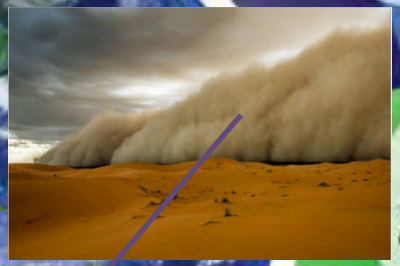
97% of all is in ocean

containing **0.009%** of its **total water**

AQUATIC ~73%

Marine covers **71%** of world's surface

Freshwater covers **0.8%** of aquatic ecosystems



Home to **34%** of all **marine species**

20% of world's oxygen produced in Amazon Rainforest

LAND ~27%

Desert covers **33%** of land masst

Home to **13%** of **world's population**

Largest deserts (m

The temperature in deserts can reach 113 F in the summer and as low as 32 F in the winter.

Q5b

Rainforest covers **6%** of land mass

Forest covers **30%** of land mass

32m acres of forest are loss each year

500m people depend on coral reefs for food and income

Coral Reefs covers **1%** of aquatic ecosystems

Home to **25%** of all **marine species**

Over **4,000** species of fish inhabit coral reefs

40 -70% of all species of the world's habitats are indigenous

Grasslands covers **31%** of land mass

Taiga makes up **27%** of the world's forest cover

Found throughout the high northern latitudes, between the tundra, and the temperate forest, mostly

Location of the

ding corals species

20%

Near Threatened

g, pollution, overfishing, gging of canals and

Domestic animals


CAMEL


DROMEDARY


LLAMA


ALPACA


SHEEP


GOAT


FERRET


PIG


DOG


CAT


RABBIT


TURTLE

GOLDFISH

Q6


COW


HORSE


DONKEY


HAMSTER

GUINEA PIG


HEN


COCK / ROOSTER

PEAHEN

PEACOCK


INDIAN PEAFOWL


DUCK


GOOSE


TURKEY


PIGEON


COCKATOO


PARROT


SWAN


CANARY

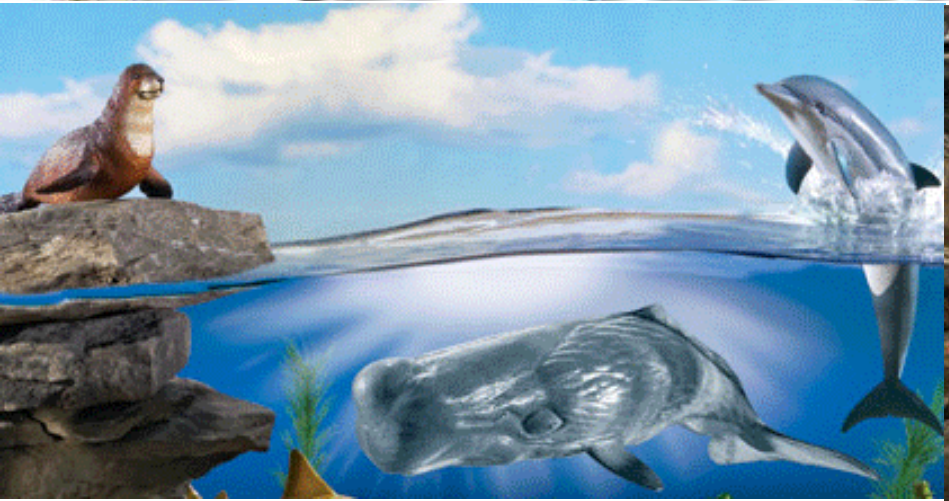
BIRDS

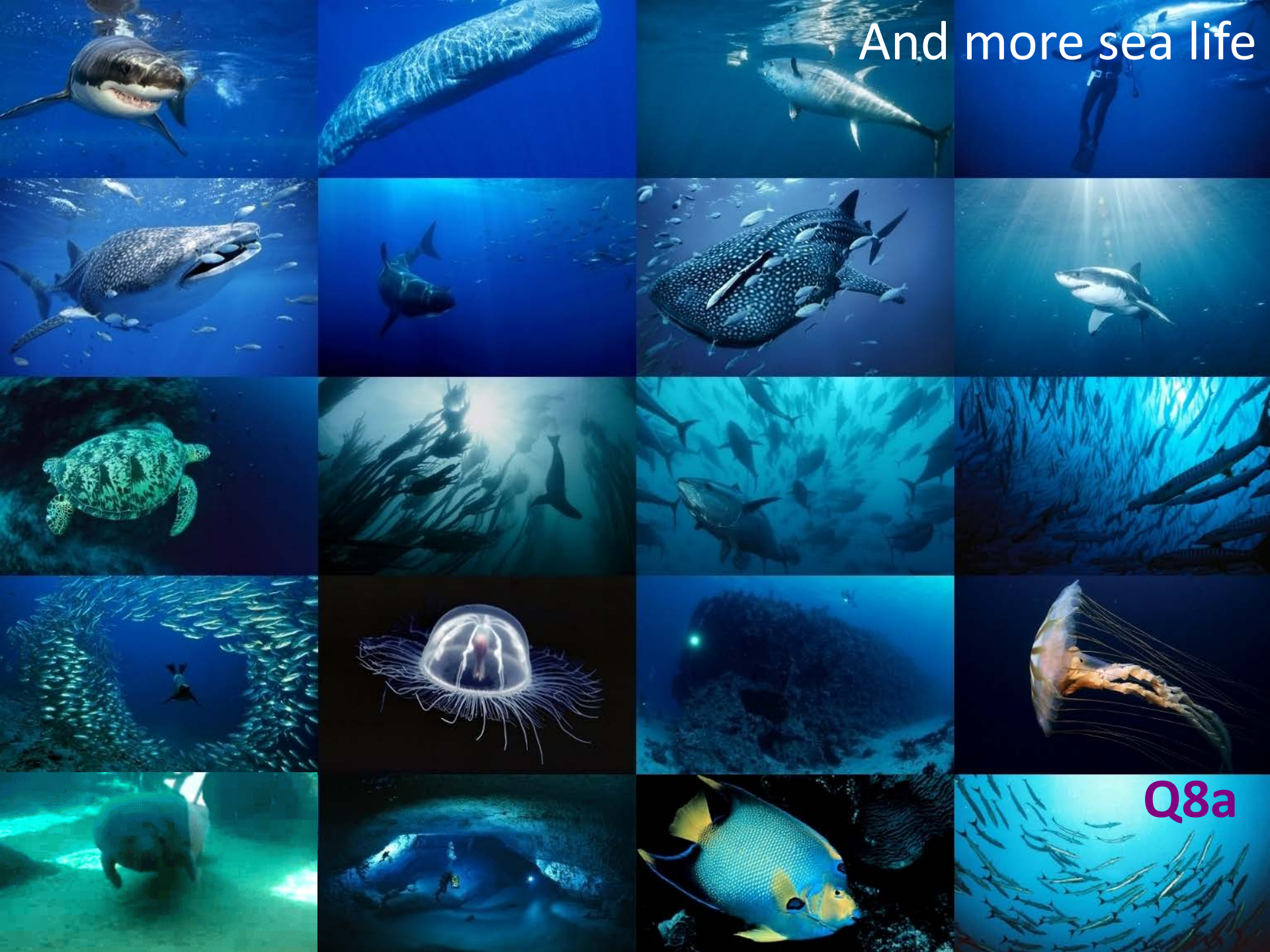

HONEY BEE


SILKWORM

Wild Animals

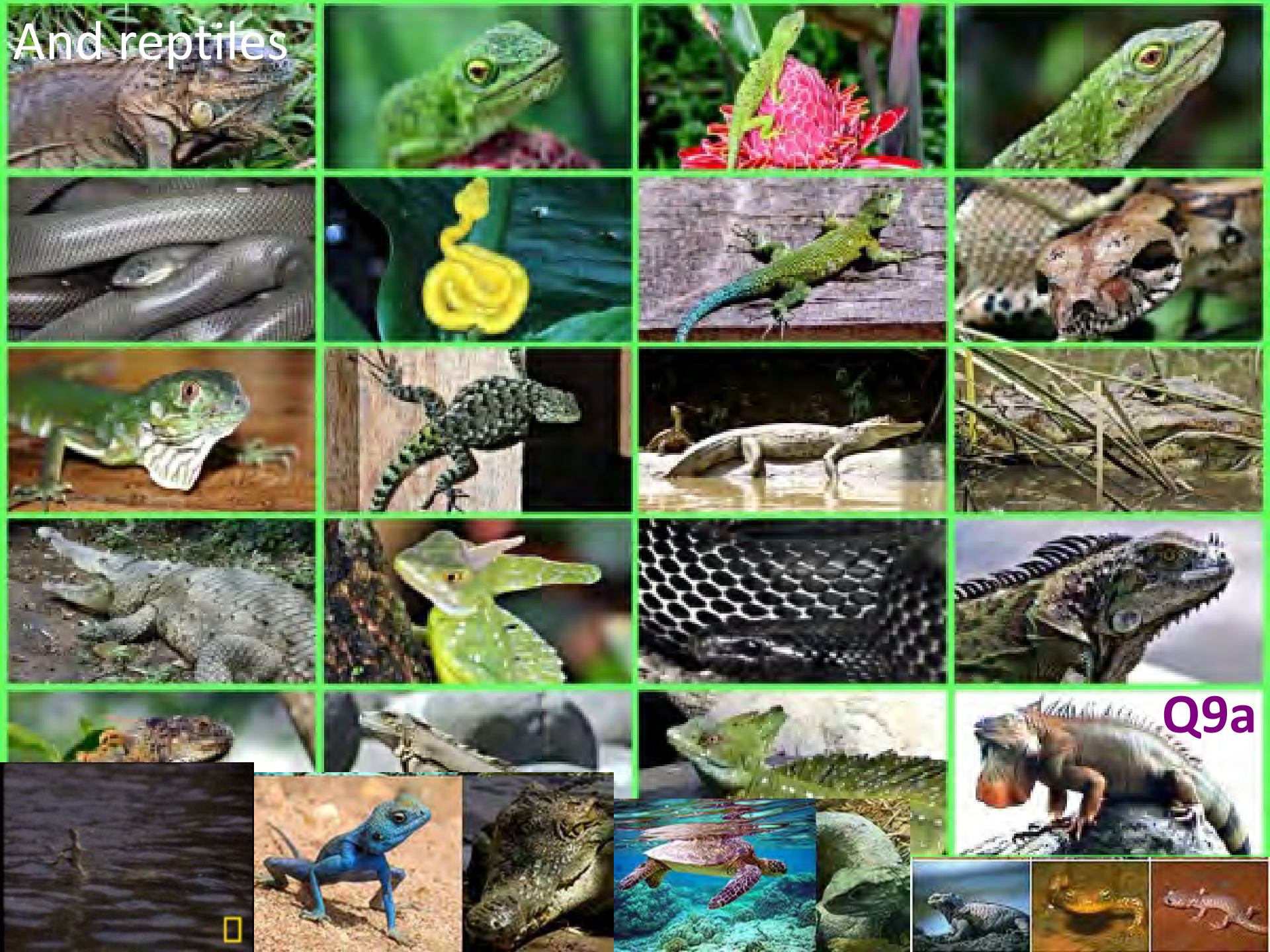
Q7



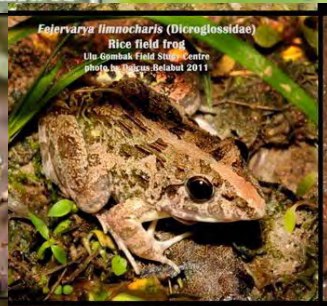

And more sea life
Q8a

And birds

Q8b


And reptiles
Q9a

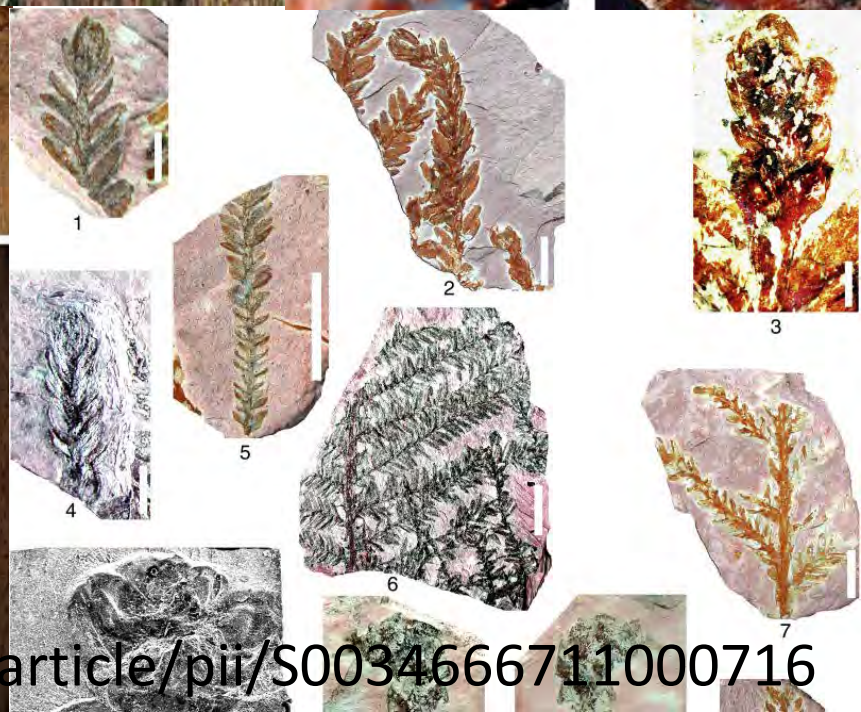
And amphibians




Edible
Plants
1D
1E
1A
1B
cape aloe
1C
1D
1E
2C
2D
2E
2C
2D
2E
3C
3D
3E
3A
3B
Kei-apple Liqueur
3C
3D
3E
Q10a
4D
4E
4F
Marula Sweets
4A
4B
4C
ANNIE'S
4D
4E
http://www.sciencedirect.com/science/article/pii/S0254629911001116

Non-edible (for humans)

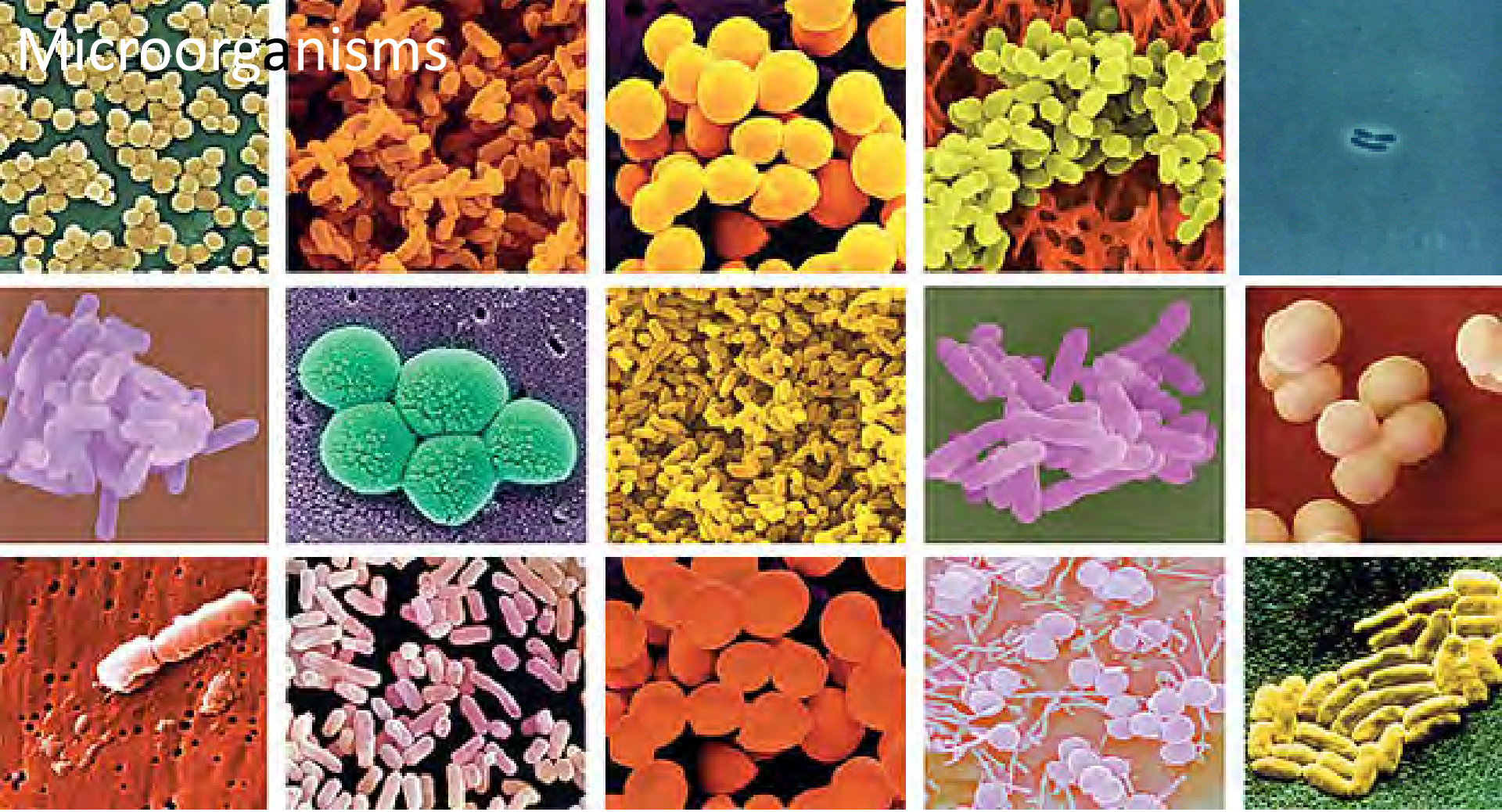
Petrified



Q10b

http://www.sciencedirect.com/science/article/pii/S0034666711000716

Microorganisms



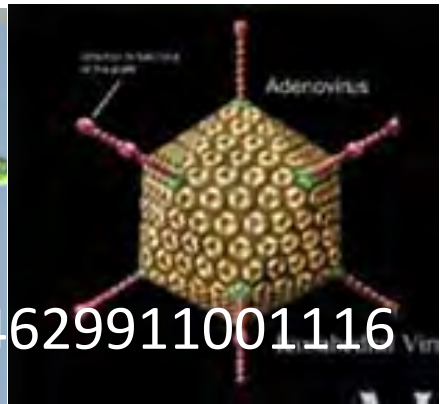
Stentor

Q11a

Amoeba

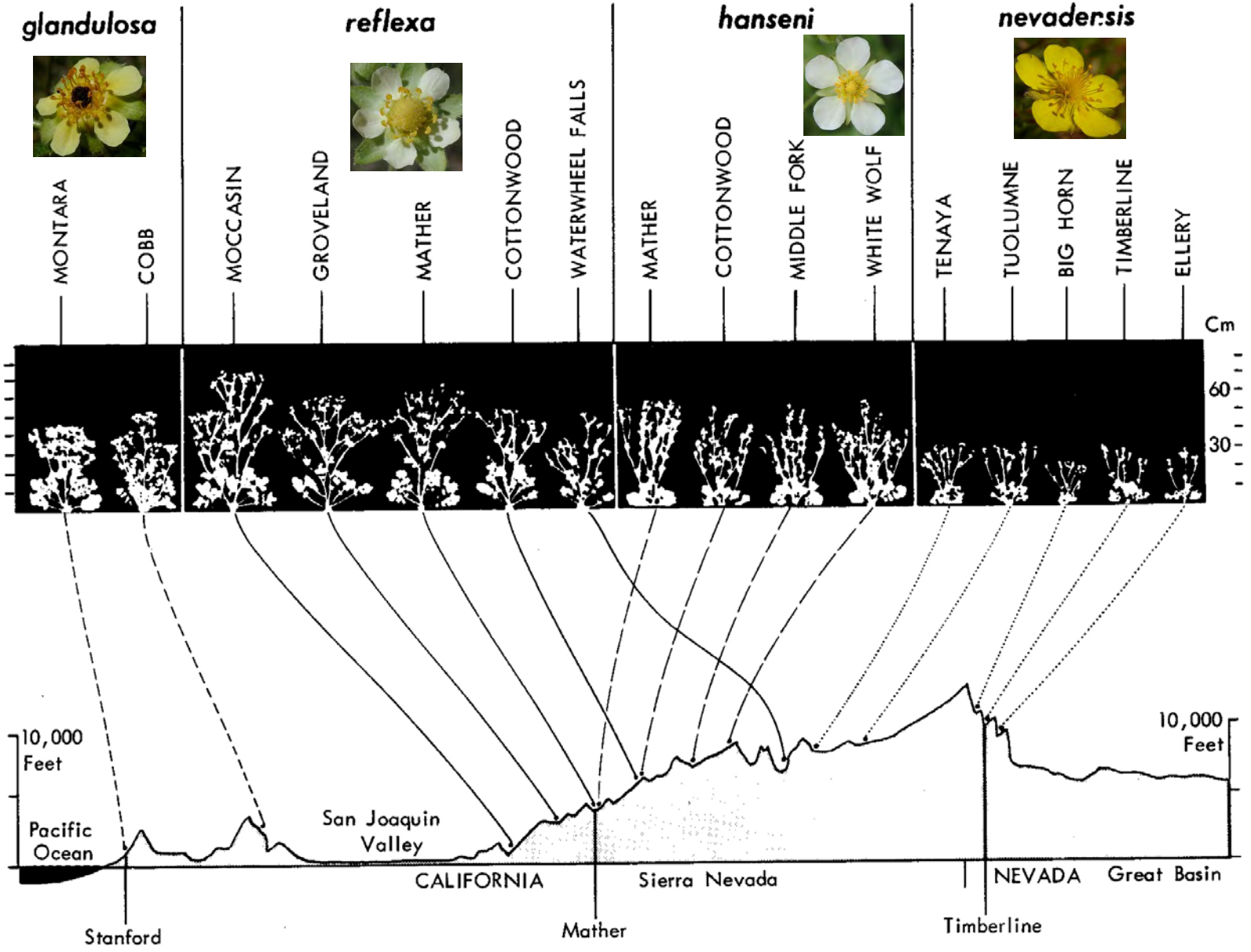
Paramecium

Euglena



http://www.sciencedirect.com/science/article/pii/S0254629911001116

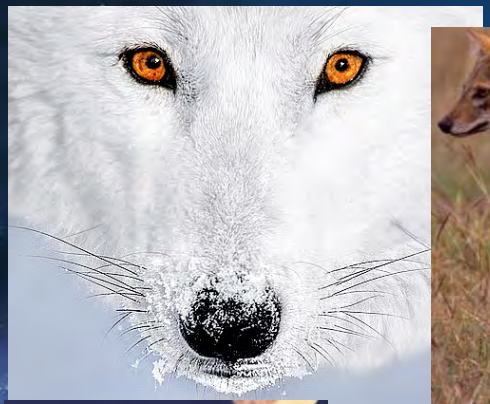

Insects …
Q11b
etc., etc.



Origins of Variation: Adaptation

Potentilla sp. (now renamed as *Drymocallis* sp.) : http://www.biology.duke.edu/rausher/lec1ex2.htm

Variation

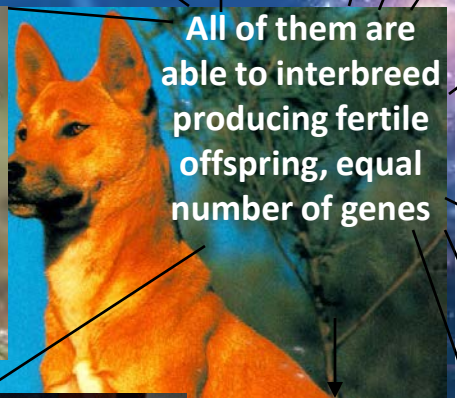


Canis lupus

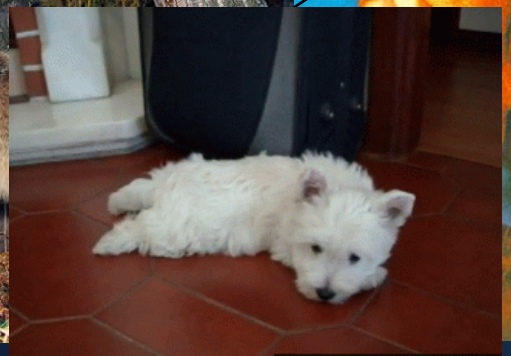
Common jackal (*Canis aureus*), side-striped (*Canis adustus*), etc.

Canis Simensis

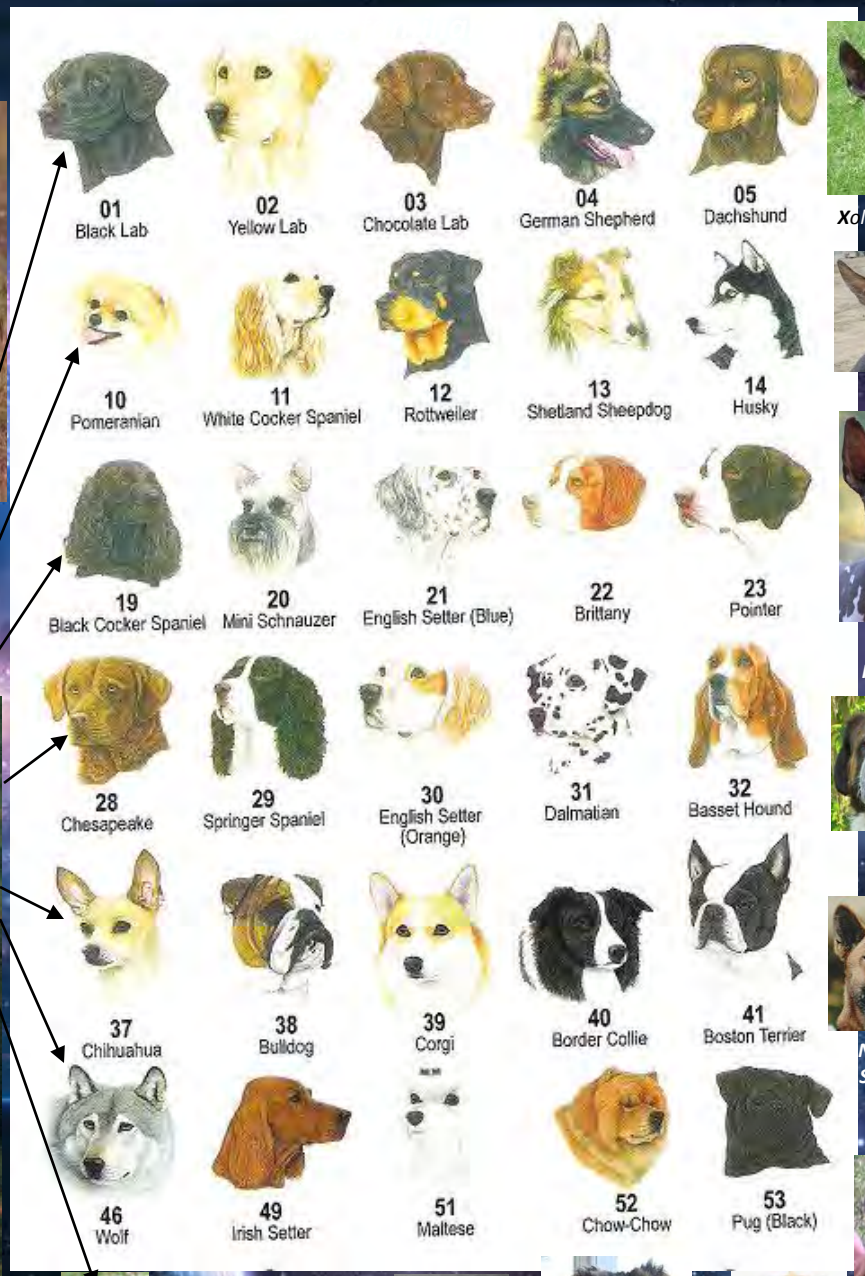
All of them are able to interbreed producing fertile offspring, equal number of genes

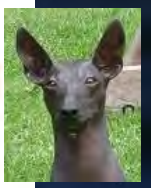


Canis latrans

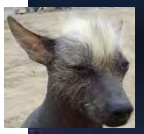


Canis dingo

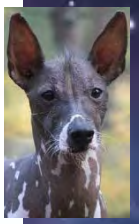




Xoloitzcuintli

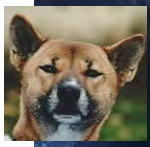


Khala

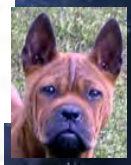


Peruivan Inca Orchid

Moscow Watchdog

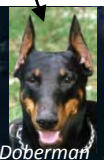


New Guinea Singing Dog (Canis hallstromi)



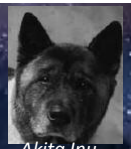
Chongqing dog

etc...

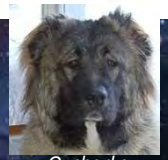


Doberman

Shar-Pei



Akita Inu



Ovcharka

Afghan

Variation

Lama glama

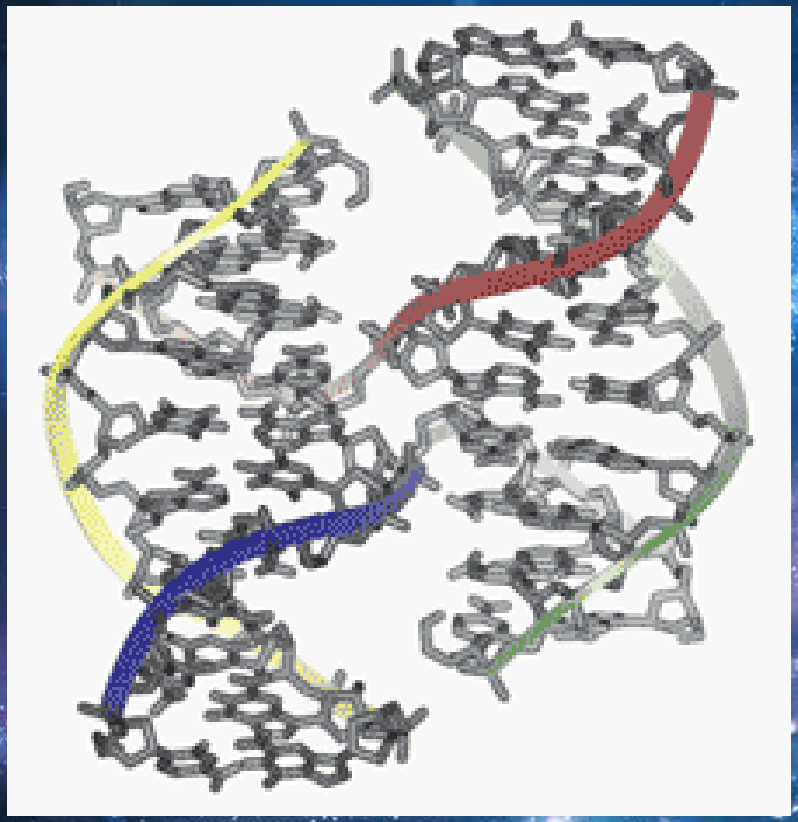
All of them are able to interbreed producing fertile offspring, equal number of genes

Lama guanicoe

Vicugna vicugna

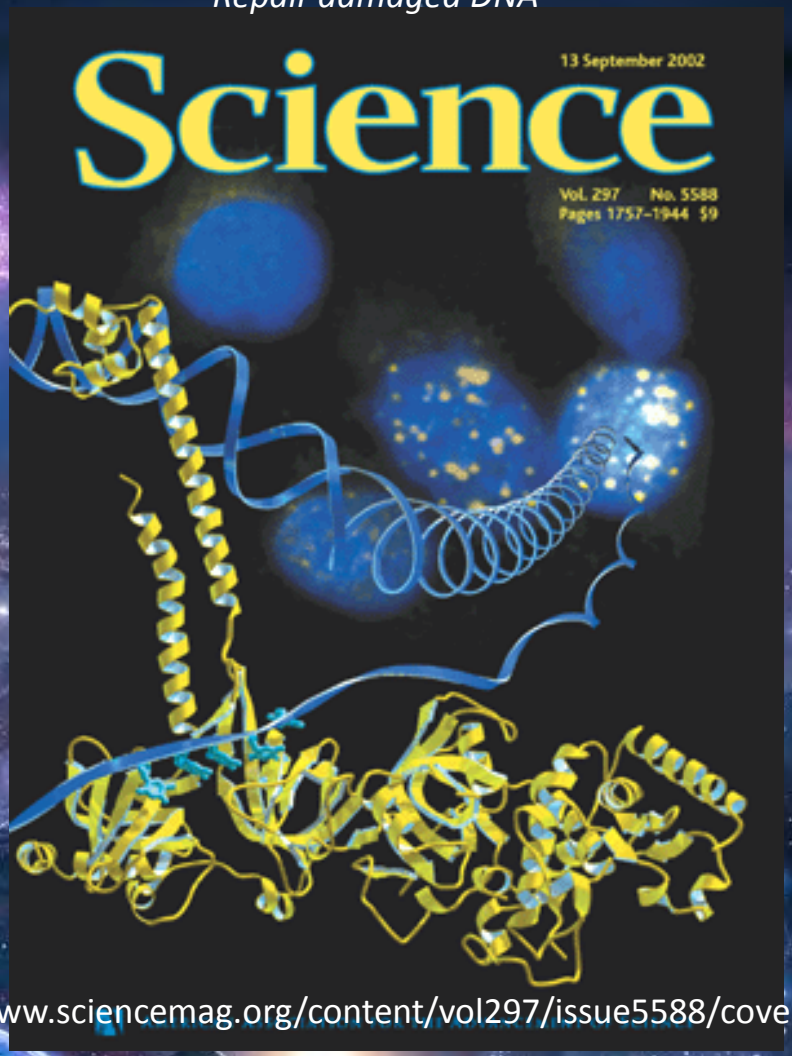
Lama pacos

Variation



http://science.cancerresearchuk.org/sci/genrecombi/68335

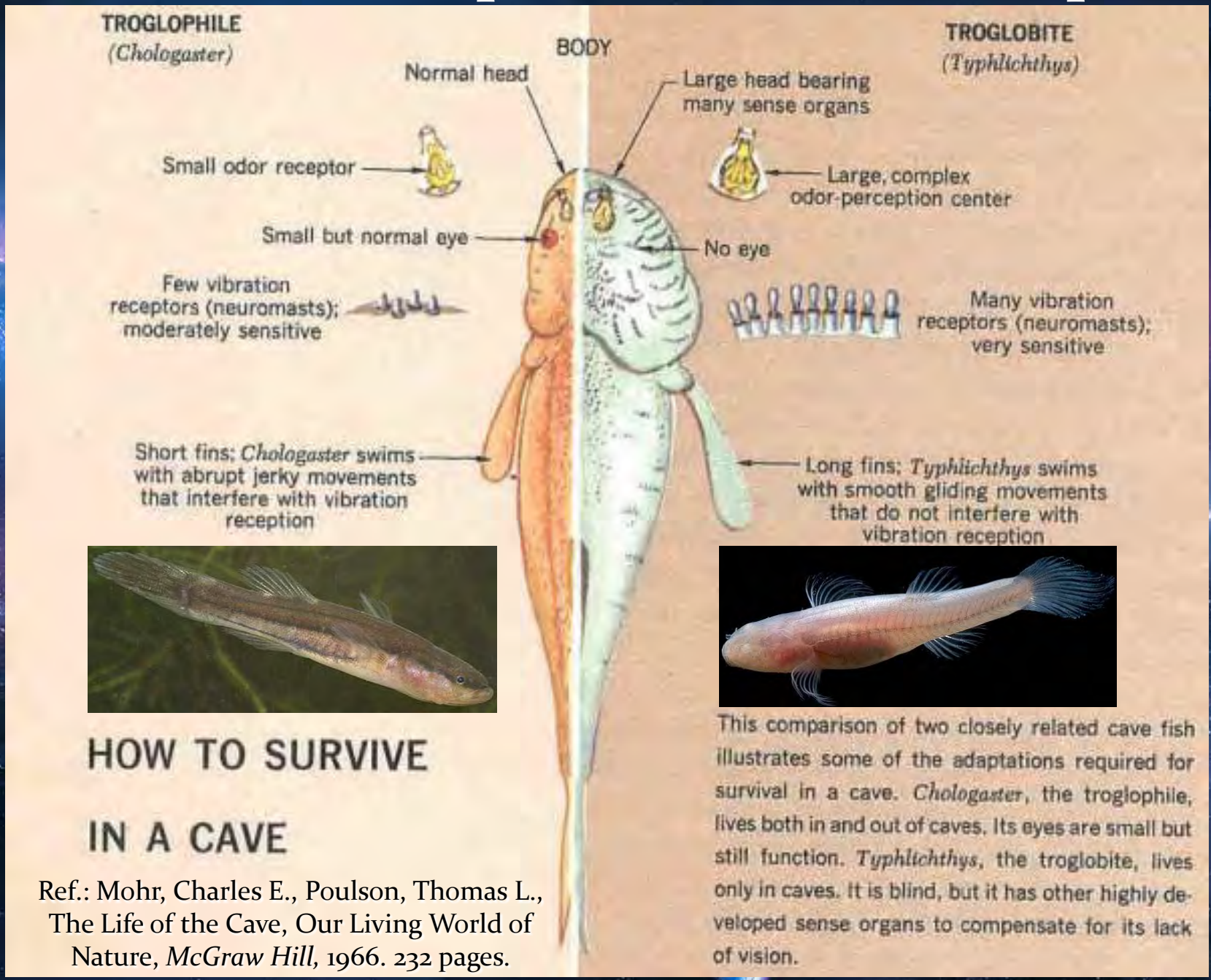
Homologous Recombination is also used to Repair damaged DNA



http://www.sciencemag.org/content/vol297/issue5588/cover.dtl

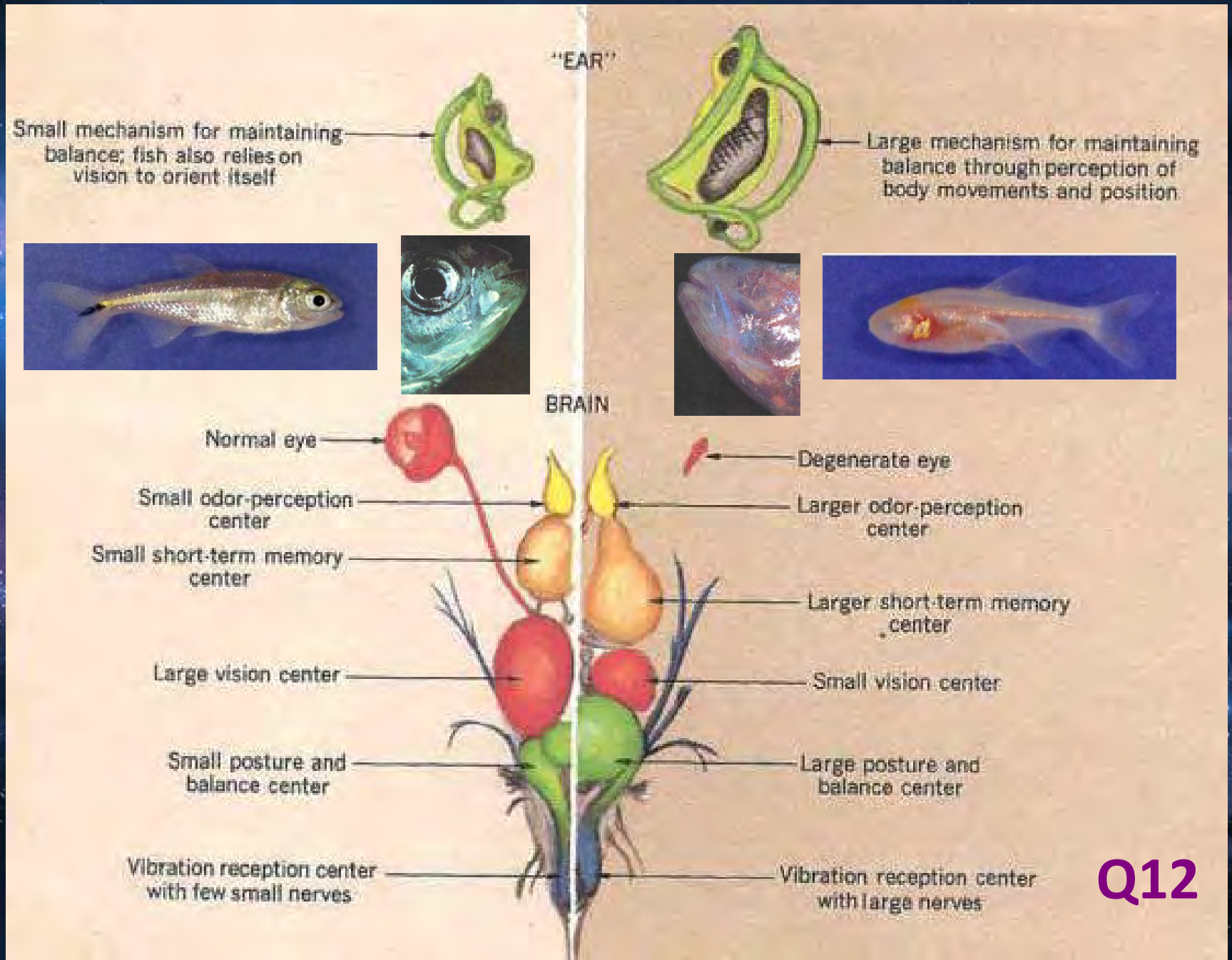
The root of variation is homologous recombination due to the same number of genes in both parents during Meiosis

Variation = Adaptation, cave example 1:



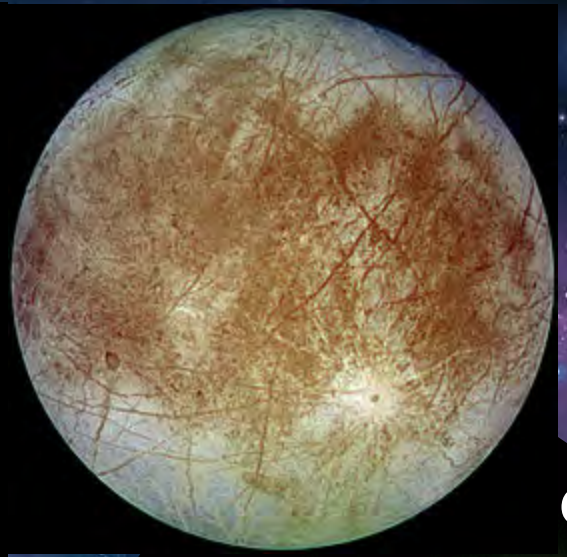
Ref.: Mohr, Charles E., Poulson, Thomas L., The Life of the Cave, Our Living World of Nature, *McGraw Hill,* 1966. 232 pages.

Variation = Adaptation, cave example 2:

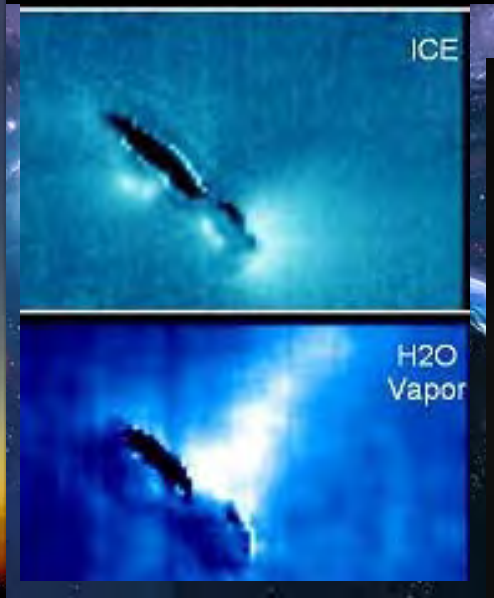


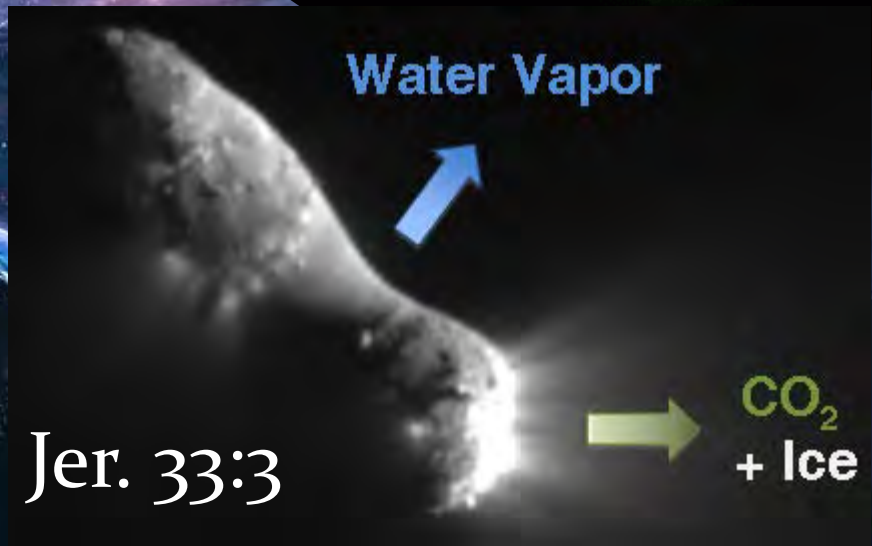
Q12

There is Water Outside the Earth!



etc…

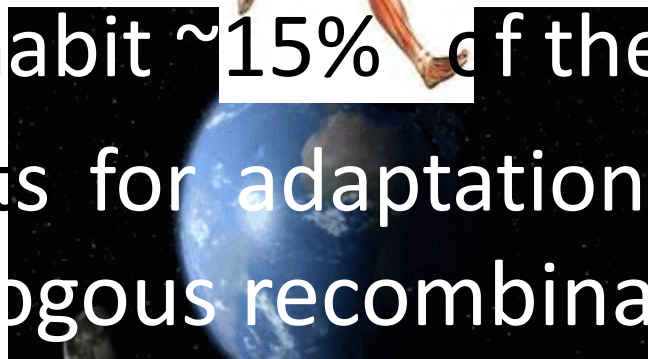




Jer. 33:3

Some Conclusions:

- The basic atoms for life are C, H, O, N.
- The double helix is replicated by the DNA pol., transcribed by the RNA pol., and translated by the ribosome according to the genetic code.
- Enzymes can be either anabolic or catabolic.
- Mitosis includes: P, M, A, T and C.
- Humans have ~11 different systems and are able to inhabit ~15% of the dry Earth.
- Variation exists for adaptation and is possible due to homologous recombination in meiosis.



Questions:

Q1 - Your Name,

Q2 – Atom(s) you want to know more,

Q3 – Molecule(s) you want to know more,

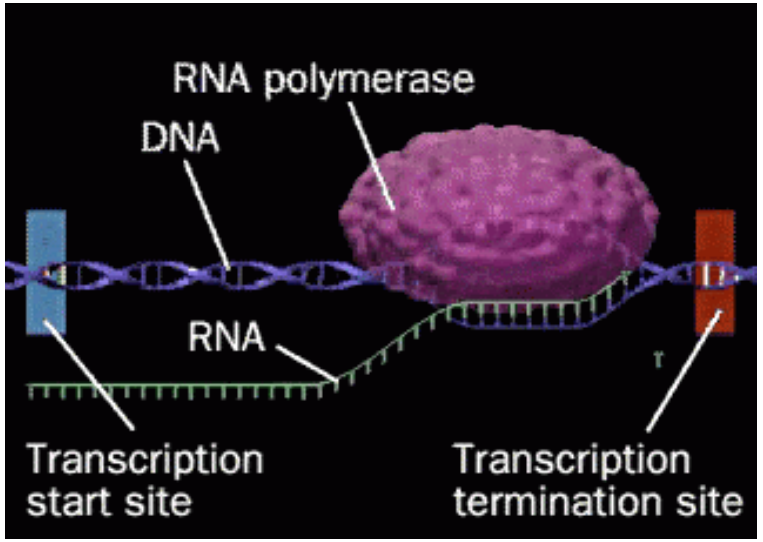
Q4a & b – Organelle &/or Tissue…,

Q5a&b Human &/or Eco- system…,

Q6 – Domestic Animal…,

Q7 – Wild Animal (Mammal)…,

Q8a & b – Sea animal &/or Bird…,



Q9a & b – Reptile &/or Amphibian…,

Q10a & b – Edible &/or Non-edible Plant…,

Q11a & b – Microorganism &/or Insect…,

Q12 – Biological topic most interesting for you.